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TABLE OF CONTENTS, PAGE 3

INDEX TO ADVERTISEMENTS, PAGE 36

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HIGH PRESSURE FIRE SYSTEM OF CINCINNATI

For Protection of Five Hundred and Seventy Acres of High-Value District—Valves and Valve Chambers—Flush Hydrants with Portable Heads—Special Features of Mains.

By J. A. HILLER.*

During the past twenty-five years the growth of most American cities has been vertical, as well as horizontal. This upward growth has, in most cases, been confined to the business districts, varying in extent with the size of the city and the volume of business transacted. The modern skyscraper buildings, reaching twelve to thirty stories in height, have entirely changed the fire-fighting conditions and rendered the old methods entirely inadequate. Where buildings are low and scattered, the use of portable fire engines has proven satisfactory, but where large areas are covered with high buildings, enough engines cannot be concentrated within reasonable distance to properly control and extinguish fires in such locations. These conditions have resulted in the installation of high pressure fire systems, consisting generally of separate mains and pumping machinery which are independent of the city water supply; although in other cases the mains have been supplied by gravity, the topographical conditions of the cities making this possible.

The conditions in Cincinnati are similar to those in other cities, and better fire fighting facilities have been needed for some time. During the past ten years, the installation of a high pressure fire system for the congested, high-value district has been talked of, reports have been made, plans suggested and approximate estimates of cost prepared. In all the earlier reports the lead of other cities was generally followed; that is, a system of separate distributing mains, valves and hydrants, and a pumping station for obtaining the desired pressure. No particular type, design, number, or capacity of pumping units was ever definitely proposed, and the question of the water supply was always deferred until such time as installation could be made.

The proposition for water supply first advocated for this system was to use the site of the old pumping station, situated on the river front about one half mile above the business district of the city. The advantage claimed for this location was that unfiltered water could be used for fire-fighting purposes. The disadvantages so outweighed this, however, that very early this plan was discarded. Among those disadvantages may be mentioned the fact that the fluctuations of the river level are about seventy feet. To place pumps in a pit sufficiently low to give them a practicable suction head during low water and to avoid flooding at times of high water would have required a structure of about eighty feet deep and the construction of an expensive intake tunnel. Owing to the difference of level between this location and the protected territory, the discharge pressures would have had to be about seventy-five pounds greater than in a station located nearer the level of the business center. Either a dry system of mains would have had to be used or continual pumpage to keep the mains filled would have been necessary. The fixed charges for interest and sinking fund on the additional cost of such a station would have been fully twenty-five times the cost of filtering the water used for the extinguishing of fires.

The next location mentioned for a high pressure pumping station was at Eighth street and Eggleston avenue. At this site there are three large mains of the city water supply, two of which are the continuation of the pump main, while the other is one of the effluent pipes of the Eden Park reservoirs. Suction could be taken from these mains at about 50 pounds pressure. Breakage in any one of the large mains would not necessarily result in an interrupted supply to the high pressure pumps. In the selection of this location and in the reports made, no fixed type, design or size of pumping units was mentioned, this question always being deferred until more study was given.

During the year 1913, the city council authorized the submission to a referendum vote of the question of a bond issue of $400,000 for the purpose of beginning the extension of the water works for the purpose of providing a high pressure fire system. No mention was made of the method proposed for obtaining this result. At the November election, this bond issue was favorably voted upon and the preparation of detailed plans for the distribution system was begun, and some contracts for pipe, specials, valves, hydrants and pipe laying were entered into and work done during the year 1914.

Since the amount of the first bond issue was but one-half the estimated cost of completing the system, additional authority was asked at the November election of 1915. This was unfavorably voted upon and the question was resubmitted at the April primary election in 1916, at which time the bond issue for a second $400,000 was authorized.

THE DISTRIBUTION SYSTEM.

As shown by the accompanying map, the district to be supplied extends from Central avenue on the west to Broadway on the east, and from Eighth street on the north to Third street on the south. The length east and west is about 3,600 feet and the distance north and south is about 2,250 feet. Considering that a strip 300 feet in width surrounding this area and on each side of the projecting mains can be served, the total protected area is approximately 570 acres. The size of mains is such that future extensions in all directions can be made. The district now under consideration is sur-

*General Superintendent of Water Works, Cincinnati, Ohio.

rounded by a 20-inch main, and is subdivided into four parts by two 16-inch mains laid practically through the center each way. All other mains are 12 inches in diameter. This will require 17,250 feet of 20-inch pipe, 6,250 feet of 16-inch pipe and 20,700 feet of 12-inch pipe, exclusive of 6,350 feet of 24-inch pipe to be laid from Eden Park as a second supply main.

MAP OF HIGH PRESSURE DISTRICT.

Four valves are placed at every cross intersection and three at each tee intersection, thus permitting any intersection or single block being shut off without interfering with the remainder of the system. Sixteen-inch valves are used in the 20-inch mains to avoid excessive depth of trenches and for more rapid shutting off. All valves are placed in brick chambers, permitting easy access for repairs. Cast iron curbs and covers are provided, on which are marked H. P. F. S. VALVE.

All pipe are of cast iron, with double grooves in hubs and on spigots. Special castings are of semi-steel with flanged ends. The flanged ends were made extra heavy and machined for tongue and groove joints.

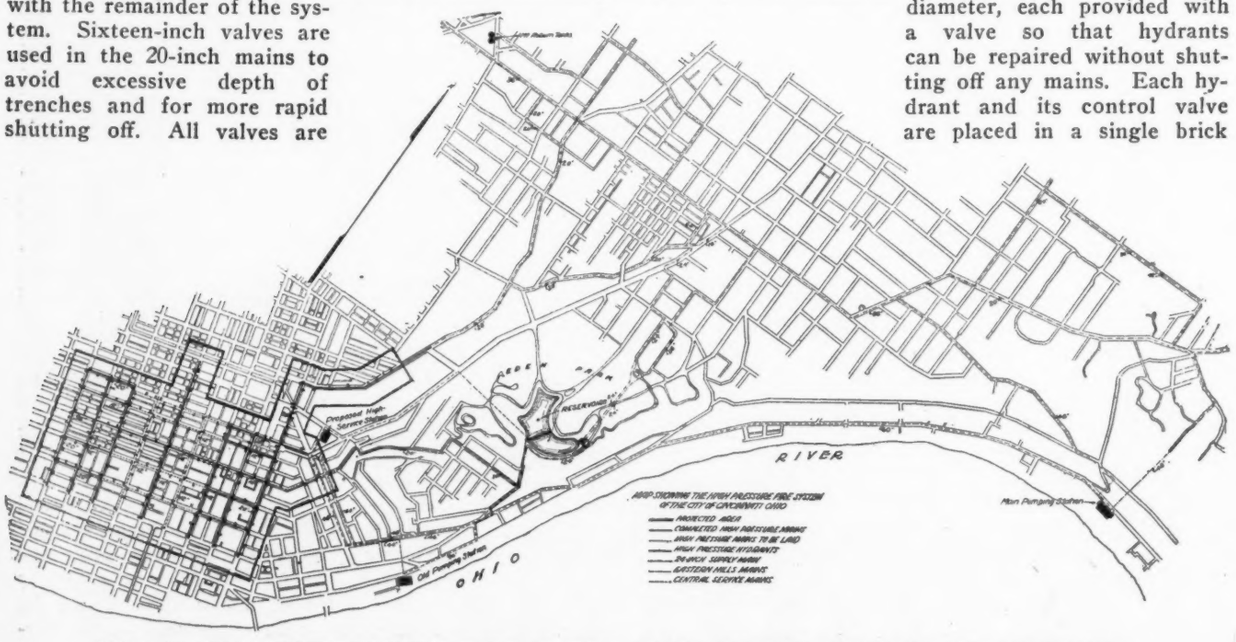
The flanged joints were made up by using two one-sixteenth-inch sheets of soft lead, between which was placed a canvas gasket soaked in red lead paste. All valves have similar flanged connections. The pipe, special castings, valves and hydrants were tested to 600 pounds at the factory and all completed mains were tested to 400 pounds after laying and before the trenches were back-filled. The requirements for leakage in completed mains were as follows:

> The leakage from mains and hydrant connections for each section tested, while under a pressure of 400 pounds per square inch, shall not be greater than at the rate of one-half U. S. gallon per lineal foot of pipe joint per twenty-four hours. The length of pipe joint shall be figured on the nominal interior diameter of the pipe.

No difficulty was encountered in obtaining this degree of tightness. In all mains laid, no leakage has been found in any of the caulked joints, but some of the flanged joints showed leakage, the stopping of which required considerable work.

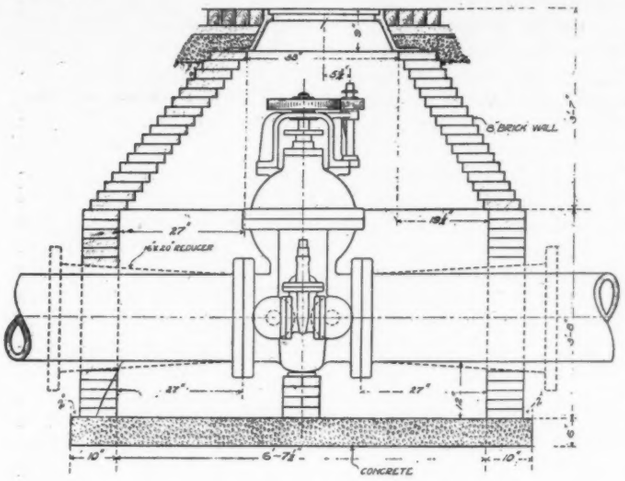
A great deal of difficulty was encountered in the pipe-laying to avoid existing sub-structures in the streets, and in many cases excessive depths were necessary.

All fire hydrants are of the flush type with portable heads, the same as adopted and used in the Baltimore high pressure system. (See Municipal Journal for June 13, 1912.) The branches to hydrants are eight inches in diameter, each provided with a valve so that hydrants can be repaired without shutting off any mains. Each hydrant and its control valve are placed in a single brick



MAP SHOWING HIGH PRESSURE FIRE SYSTEM, MAINS, PUMPING STATIONS AND RESERVOIRS.

chamber with a cast-iron curb and two covers, one marked H. P. F. S. VALVE, the other H. P. F. S. HYDRANT.



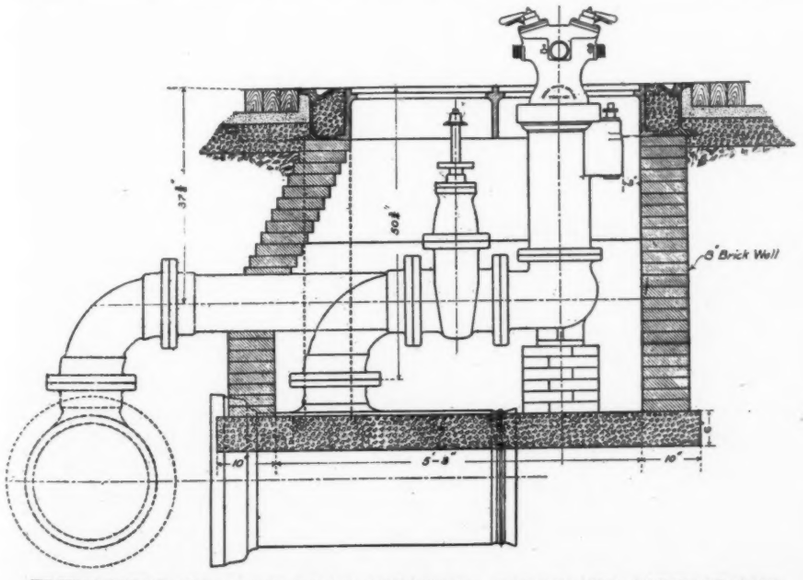
CHAMBER FOR 16-INCH VALVE.

Wherever practicable, the hydrants are placed within the car tracks. This is done for two reasons: The traction company is always the first to remove snow from the streets, therefore the hydrants will be cleared of snow as early as possible; and having the hydrants within the street limits rather than on the sidewalks, there is less danger of injury in the case of falling walls. Each portable head for the hydrant is equipped with four 2½-inch outlets provided with controlling valves which permit any pressure from a complete shut-off to the maximum available. There is a fifth 2½-inch outlet without valve, which can be used for the attachment of a turret nozzle to be used as a deluge stream or a fire curtain.

Two hydrants are placed at every street intersection and at least one between streets. Thus, within a single block twenty streams can be thrown without using more than an average of 300 feet of hose for each.

The number of hydrants placed to date is 182, which, with 56 to be installed on uncompleted mains, gives a total of 238, or an average of one hydrant for each 186 feet of main or one hydrant to each 2½ acres of protected area.

(To be continued)



FLUSH HYDRANT WITH HEAD ATTACHED, VALVE AND CONNECTIONS.
Shows alternative connections when over or at one side of main. Combined hydrant and valve chamber, with double curb for two covers.

COST OF CONCRETE PAVING IN SAVANNAH.

During 1916 the city of Savannah constructed by force account 31,503 sq. yds. of concrete pavement. All was one-course, the average thickness being 6¼ inches and the proportions 1:1½:3. Concrete was mixed in an Austin cube mixer No. 13, one minute being allowed the mixer for each batch. The consistency of the concrete was such that only shovels were used for placing. Grade pegs were set for six-foot squares. Great care was taken in the construction and every precaution used to bring about good results. Some of the pavements have been down more than a year and to date no signs of cracks have appeared.

Itemized Cost of Constructing Pavement.

Labor:		
Watchman	$0.0165	
Grading	.0468	
Handling cement	.0062	
Handling sand	.0268	
Handling crushed stone	.0376	
Spreading concrete	.0225	
Operating mixer	.0391	
Finishing surface	.0135	
Making expansion joints	.0053	
Covering pavement	.0069	
Moving equipment	.0060	
Cleaning up	.0201	
Removing trees	.0022	
Resetting curb	.0011	
Total labor		$0.2906
Teams:		
Grading	$0.0146	
Moving equipment	.0012	
Cleaning up	.0042	
Covering pavement	.0006	
Total hired teams		$0.0206
Materials:		
Cement	$0.5608	
Sand	.0565	
Crushed stone	.3922	
Expansion joints	.0088	
Coal	.0041	
Tools and hardware	.0190	
Lumber	.0029	
Use of equipment	.0216	
Total materials		$1.0658

Joints were formed by using metal plates with tarred paper between, the plates being withdrawn while the concrete was still fresh enough to fill the crevices left by their removal. The paper of the joint is left standing an inch or more above the surface. This protects the edges of the concrete slabs until they attain their full strength. The expansion joints are placed 35 feet apart and also along the curbs. A split float was used on the joints, giving them a beaded edge. The final finish was given to the surface by rolling with a galvanized metal cylinder and then floating with a one-inch rubber garden hose.

The prices of the material delivered on the work were recorded and all costs carefully kept. The cement cost was $1.63 a barrel for approximately one-third of the amount used and $1.75 a barrel for the remainder. Crushed stone cost $2.64 to $2.68 per cu. yd. and sand 70c. and 80c, two-thirds of the amount used being pur-

chased at the higher figure. Tar paper for the expansion joints cost 74c and 96c per roll, coal $3.60 per ton and lumber $20 per M. The construction gang was composed of white laborers, 20 of whom were paid $1.75 per day and the other ten $1.50. The foreman was paid $4. Nine hours constituted a working day. A mule and a cart combined cost $1.50 a day and the number used varied from 1 to 6. The total cost of the pavement was $1.377 per sq. yd., or $7.95 per cu. yd. of concrete in place. The itemized costs for labor, teams and materials were as given in the table on the previous page.

SEWAGE DISPOSAL FOR A NEW YORK AREA*

Methods of Treatment Recommended—Grit Chambers, Sedimentation Tanks and Oxidation—Separate System Advocated—Principles of Design.

Concerning treatment, it is proposed that all the sewage be passed through grit chambers before pumping (the topography seems to render necessary the pumping of a considerable part of the sewage collected), both to prevent undue wear of the pump impellers and also to prevent the clogging of sludge pipes from the sedimentation tanks. If sedimentation tanks of the Imhoff type are used, the digested sludge from these can be drawn off to sludge beds for drying and then used for filling in low land, of which there are thousands of acres in the vicinity of the probable locations of treatment plants. Should this use of sludge ever be considered undesirable, it can be drawn from the tanks into sludge steamers and dumped at sea, as is customary in the large coast cities of Great Britain.

In connection with the discussion of treatment methods, the author gives a considerable amount of information concerning the creation of nuisance by existing plants for oxidizing sewage, which will be given as a separate article in another issue. From the information collected and contained in the matter just referred to, the author concludes that where large volumes of sewage are to be treated in sprinkling filters, only fresh sewage should be applied to the filters or else they should be placed far from habitable property.

The line of distinction between fresh and stale or septic sewage seems, from the investigation referred to, to be a distance of six or eight miles from the center of population to the disposal plant under ordinary conditions and in warm weather. That is, if a flow of more than six or eight miles is required for sewage to reach a treatment plant, it is likely to arrive there in a stale condition. In planning for 40 years ahead, the sewers must, of course, be adapted for volumes of flow very much larger than those that they will carry for the first few years after construction; and if the calculated velocity for the sewer floating half-full is three feet per second, it is quite probable that the average velocity for the first few years may not exceed 1½ feet, and consequently the time required for reaching the treatment plant be twice as long as that 40 years hence. It may, of course, be that, during the first few years, even if the time of flow permits the formation of septic conditions in the sewage before reaching the treatment plant, the plant itself will be at a considerable distance from the nearest inhabited section; and that, by the time the population has advanced near enough to the plant to be affected by odors from it, the amount of sewage, and consequently the velocity, will have increased so as to cut down the time of flow to a safe limit.

*Concluded from page 580.

Concerning the matter of discharge of effluent, Mr. Allen considered the suggestion of discharging during the ebb-tide only, as is done at the Moon island outlet of the Boston metropolitan sewers; under which condition all of the sewage would be carried into the ocean and none would enter the bay except such highly diluted sewage as would return through the inlet with the flood-tide. This he considers to be undesirable for several reasons: "In the first place, the storage of sewage already several hours old for six or more additional hours will bring about septic conditions, resulting in objectionable odors about the tanks and in the neighborhood of the effluent after discharge. The concentrated discharge of 12 hours' sewage within a period of less than half that time will intensify the pollution throughout the sewage field to a very great degree. Finally, the unfavorable effect of this intensification is further increased by the greater and more immediate demand made on the available supply of dissolved oxygen in the waters of the inlet by the introduction of a septic effluent than would obtain with the addition of an equal volume of fresh sewage, so that, for all practical purposes, the result would be equivalent to the discharge of a much larger volume of sewage than proposed. The cumulative deleterious effect of an intermittent discharge after storage is very evident to one crossing the sewage field below the Moon island outlet, although it is but fair to say that these conditions are both temporary and local and in a locality where there is little navigation. Yet another objection lies in the fact that the discharge of the sewage in from one-half to one-third of the time would necessitate the construction of extensive and costly storage tanks, with effluent channels and outlet pipes of from two to three times the capacity otherwise required."

For these reasons he believes that the suggestion may be dismissed without further comment; although it is possible that others will not consider the reasons to so convincingly demonstrate the undesirability of the practice.

He suggests the possibility of avoiding a nuisance near the treatment plants due to septic sewage by covering the tanks, as is done at London and Frankfort; and by covering the sprinkling filters, as is done at Mt. Vernon, N. Y. He also suggests the possibility of supplying the sewage with oxygen during transit by aeration or otherwise so as to effectually prevent septicization. "The effectiveness of the first two remedies is questioned in the case of very large works and in any case would not affect questions of potential subsequent nuisances due to the effluent, while the efficiency and economic aspects of aeration are somewhat problematical."

It is possible to appreciably reduce the putrescible material in the effluent by fine-screening the sewage near its source, as is done to a certain extent in both Paris and Berlin.

Concerning the disposal of sludge, the volume that will be produced at the main sewage treatment plant, at which will be treated 272,000,000 gallons of sewage per day, is estimated to be 10½ times the population served in thousands, or 22,575 cubic feet. This would be wet sludge of perhaps 80 per cent moisture. By providing drying beds giving 0.4 square feet per capita area, or 20 acres for a population of 2,150,000, the sludge may be reduced 60 per cent by air drying, producing 335 cubic yards per day of dried sludge.

The gas given off by Imhoff tanks would be large in volume and could possibly be put to some use. The amount varies greatly with the temperature and with details of operation. At the Peachtree creek plant at Atlanta, Ga., 3,750 cubic feet of gas are produced per million gallons of sewage, which is utilized for heating

purposes and other uses about the works. If, in the cooler climate of New York, we allow 3,000 cubic feet per million gallons, this main plant would ultimately furnish over 800,000 cubic feet per day. The gas, which is chiefly methane, contains from 587 to 839 British thermal units. It is worth considering whether the energy available in this gas cannot be used for purposes of power, heating and lighting at the plant and used in the pumping station, which it is proposed to locate close by.

Since the water in those parts of the bay furthest from the inlet experiences the least effect from the replenishment of the water by tidal movements, the sewage discharged at these points must be more thoroughly treated than that discharged at the inlet. It is therefore assumed that sewage discharged at such points will be subjected to some sort of oxidizing treatment in addition to sedimentation or screening.

DESIGNING THE SEWERS.

The author discusses the question of whether the sewerage system should be upon the separate or the combined system, and concludes that the separate should certainly be selected; although it is possible that some sewers ultimately to be used as mains of the separate system may be used temporarily for removing a greater or less amount of storm waters, overflows to streams and shores being provided for the escape of the surplus at times of heaviest rainfalls. It should be made perfectly plain, however, that such use is to be only temporary and that, whenever called upon, the citizens must disconnect their rain-water leaders from these sewers.

A large part of the sewage of this district will need to be pumped, and all of it will need to be treated, and this furnishes a most forcible argument for the adoption of the separate system, since both pumping and treatment can be performed more economically and effectively by avoiding the great fluctuations that occur in the storm flow of combined sewers. For this reason, the entire city of Baltimore has recently been sewered on a strictly separate system, as first advised in 1881 by Charles H. Latrobe and, so far as is known, with its advisability never having been questioned. New Orleans is another large city that has recently completed its sewerage on the separate system. In most of our important towns, such combined sewers as exist were built before the idea of separating domestic and storm sewers had been suggested. In 1908 Rudolph Hering, in a report to the president of the borough of Manhattan, recommended the entire reconstruction of the sewers of that borough on the separate system. C. D. Hill, superintendent of the bureau of sewers of Chicago, after a year's investigation of the reconstruction of sewers necessary for the "loop district," gave as his opinion that "It is necessary to completely separate the storm water from the sanitary sewage. Storm drains should flow by gravity to the river, have no siphons and be of ample capacity. . . . Sedimentation basins to intercept the sludge near the rivers are recommended. . . . A separation of the rainwater ducts and the sanitary sewers of buildings should be effected." In Worcester, Mass., the separate system has been superseding the combined system so that in 1915 there were 106 miles of separate sewers, as against 69 miles of combined sewers, there being 59 miles of storm water sewers. All the recent extensions in Fitchburg, Mass., Rochester and Milwaukee are being built on the separate system, while in the smaller cities and towns of this country the separate system is almost universal.

Where the combined system has been once established in a large city, there is no instance known to the author where it has been entirely abandoned, because of the great difficulty and expense entailed. Five or six years ago, Pittsburgh, when considering the treating of its sewage, had a careful estimate made by N. S. Sprague, chief engineer of the Bureau of Construction, of the cost of entire reconstruction of the separate system. This estimate gave a total cost for the sewers proper of $4,393,407, and in addition to this $1,340,100 for house connections and $8,078,220 for changing house plumbing. This totaled $156.11 per building or $2.94 per lineal foot of sewer. To each of these costs 15 per cent was added for engineering, inspection and contingencies. Such changes have been made, however, under specially urgent conditions. For example, in about 29 acres near Canal street, Manhattan borough, New York, it has been decided to put in the separate system to provide deeper and better cellar drainage. The separate sewage will then need to be pumped, the storm water discharging by gravity at a higher level as at present.

The size of the plant, Mr. Allen believes, should be calculated for not less than about 40 years ahead. Although any forecast for more than 25 or 30 years ahead is liable to more or less error, he considers that works of the permanence and magnitude of those under consideration should be designed to serve for at least that period of time. As a general proposition, the smaller the place and the larger the percentage of unoccupied territory which will probably be developed, the greater is the risk in expending large sums far in advance of their actual need and the greater is the burden on the population to meet the original costs. For this reason the plans for the Brooklyn portion of the area were based upon the estimated 1960 population, while those for the areas in Queens county, where the development has not progressed as far, is based upon the 1950 population.

Considering the matter of seepage, since some of the sewers in the systems have already been in existence for a number of years and some will be new, some will be well-built and probably some of the older ones poorly built; some will be located in dry soil, and others in wet and porous material, the author assumes, without attempting to classify the conditions favoring infiltration, that this will amount to about 40,000 gallons daily per mile of sewer. It is further assumed that, after being fully developed, there will be 25 miles of sewer per sqare mile of territory, so that the infiltration may be taken as one million gallons daily per square mile, or .0024 cubic feet per second per acre of territory drained.

In designing interceptors and treatment plants, he assumes that the maximum rate of dry weather flow will be equal to the infiltration plus one and one-half times the mean water consumption; but as a safety factor to provide for unforeseen contingencies and also to care for the first flush of storm water brought down by combined sewers, the capacity of interceptors and treatment plants is calculated by using one and one-half times the infiltration of ground water plus twice the mean dry-weather flow of domestic sewage.

The hydraulic grades for the sewers are calculated by the use of Kutter's formula with a friction coefficient of 0.013 for cast iron or vitrified clay pipe, and 0.015 for concrete or brick work. For minimum velocity in interceptors, Mr. Allen recommends 2.25 to 3.3 feet per second when running full or half full, the higher rates applying to the larger sizes approaching the place of disposal. "In this way the head is conserved where gradients are necessarily high, while there is a material economy in the smaller diameters and but slight loss of head in adopting the higher velocities where very large sizes are necessary. There is the further advantage that an increasing velocity toward the outlet will tend to prevent the accumulation of deposits."

PAVING PRIVATE ALLEYS IN BALTIMORE.

Beginning in the latter part of 1915 and the first of 1916 a general campaign for cleaning up all the alleys in the city of Baltimore, Md., was begun. The Health Department was notified to inspect and report on all of the alleys, first giving the property owners the right to improve them. If same was not complied with after notice was given, then the Health Department was to issue an order for the paving of said alleys on the highways engineer.

During the year 1916, 396 alleys one square long or less were paved under orders from the Health Department by the highway engineer, R. M. Cooksey. During 1917 and to date there have been paved 1,976 alleys one square long or less.

These alleys are being paved with a six-inch concrete construction and are being done under contract, the cost therefor varying according to the lowest bids of the contractors, which in turn varied greatly on account of increase in cost of labor and materials due to war conditions.

The first alleys paved—that is, those alleys contained in contracts from one to twelve—averaged approximately 85 cents per running foot. This covers all the cost, such as advertising, surveys, engineering, search of records for property owners, paving, etc. Due to increased cost of materials, as stated above, the alleys paved under the next twelve contracts averaged about $1 per running foot. And for the same reason the alleys now being paved will cost the property owners approximately $1.15 per running foot. These prices are based on an alley ten feet wide, and include a five-year guarantee covered by bond.

The total alleys estimated to be handled under the private alley paving program, was 3,000 alleys one square long or under. This will probably be slightly increased on account of the alleys opened in the annexed portion of the city since arriving at these figures.

The city expects to complete this year in the neighborhood of 2,200 of the total outlined above, leaving approximately between 800 and 1,000 to be done during the year 1918.

ADMINISTRATIVE WORK AT CAMP MERRITT*

Organizing the Force and Coordinating All Branches of Work to Secure Completion of Cantonment for 30,000 Men in Three Months.

The firm of Nicholas S. Hill, Jr., and S. F. Ferguson, consulting engineers of New York, was appointed to take complete charge of the construction of Camp Merritt on August 10, 1917. This was one of three or four cantonments in which the entire construction was placed in the hands of one engineer or firm of engineers. In all of the other camps the engineers had partial control of the work, or in some cases acted in a consulting capacity; but experience with all three plans has, we believe, resulted in the conclusion that the plan of giving complete supervision to one engineer or firm of engineers has produced best results.

The problem confronting the engineers at Camp Merritt was the construction of approximately 800 buildings, general plans for which were provided by the Government, and supplying them with all the necessary public conveniences such as streets, water, sewers, electric light and railroad facilities. These buildings had to be placed upon a specified area in accordance with a general city plan. Part of the area selected was timbered, part overgrown with underbrush, and other parts were occupied by about a dozen residences and several other buildings, each surrounded by a greater or less area of developed property. The area was traversed by two main highways, which form the north and south and east and west axes of the camp. There were also several short tributary public streets. All of these public highways have been closed to public use by consent of the local authorities, but have been retained as the main thoroughfares of the cantonment.

All of the work was done under general rules outlined by the Government in Washington with relation to design and materials of construction. For example, the per capita consumption of water to be provided for was specified, and the basis upon which the sewer sizes were to be computed was fixed. Vitrified tile pipe was specified for sewers, wire-wound wood-stave pipe for water mains, and galvanized wrought-iron pipe for water house-service connections. The standardization of design resulted in a saving in the time required for local designing; and by standardizing in advance the character of materials to be used and by placing orders for these materials and holding them in reserve, prompt and certain delivery was much facilitated. In fact, by such standardization the Quartermaster's Department was able to know in advance that a certain minimum amount of certain kinds and dimensions of lumber, pipes, etc., would be required, and these had already been ordered and many of them were on the ground before the plans had been completed.

The completion of the camp ready for use in the shortest possible time was the first and most important consideration. In order to effect this, a most careful coordination of all branches of the work was necessary, and so well was this done that it may be said in a general way that all branches of the construction were brought to completion at about the same time, **all having been practically finished three months after the appointment of the engineers,** with the exception of about 10 per cent of the buildings.

While working details were being prepared by an office force in the New York office of Hill & Ferguson, a completed organization for carrying on the construction was being perfected and put to work. This organization had to be such as to carry on simultaneously the construction of railroad branches and sidings, roads, buildings, water and sewerage systems, fire protection, lighting, heating, plumbing, etc. In general, each of these required the attention of three branches of the organization—designing, construction engineering, and inspection of materials and of construction. When the force was fully organized it contained between 125 and 130 engineers and inspectors.

Meantime the city planner had been completing the general layout of the camp, the grouping of the buildings and location of main roads and of company streets. As soon as this plan had been completed, the streets were laid out upon the ground and profiles of them taken. By use of these profiles the design of the sewerage system was prepared, the elevations obtained by the survey being used also for preparing a topographical map of the property. Following this, excavation was at once begun of the trenches for the sewers and water mains and the laying of these was prosecuted as rapidly as possible. At the same time the buildings were staked out for the contractor as fast as he was able to put men on their construction. Engineers and contractors who have been engaged on large pieces of work will appreciate the celerity with which the preliminary work was carried forward when we state that actual construction was begun ten days after the engineers were notified of their appointment.

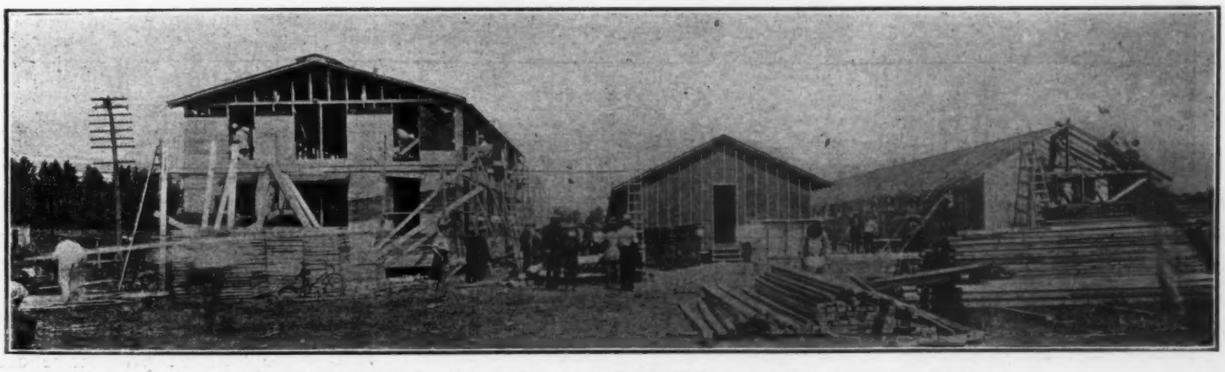
One of the first matters was the provision of temporary

*A description of the construction of this cantonment was given last week.

N. E. CORNER OF THE CANTONMENT GROUNDS, AUGUST 22D.
Taken from the intersection of two of the existing roads.

SAME AREA AS ABOVE, TAKEN AUGUST 29TH.
Foundation piles have been driven and framework is under erection.

SAME AREA, TAKEN AUGUST 30TH.
Note progress made in twenty-four hours.



BUILDINGS ONE BLOCK FROM AREA SHOWN ABOVE, AUGUST 27TH.
Photograph taken seven days after contractor began work.

water and other sanitary systems for the laborers, which, of course, could not wait for the completion of the permanent systems. (These were referred to in the previous article.)

In order to keep track of the rate of progress of each class of work, a progress chart for each of them was kept up with daily entries, so that the engineers could know at any time what percentage of the buildings, water mains, sewers, etc., had been completed to date, what percentage of each class of material had been received, etc., so that special pressure could be exerted in whatever direction it seemed most necessary.

The organization formed by the supervising engineers was in charge of Nicholas S. Hill, Jr., as supervising engineer, who directed the work. It was divided into four departments—executive, designing, construction and city planning. The executive department was in charge of S. F. Ferguson; the designing was done by Stuart K. Knox, of the firm of Hill & Ferguson, who was assisted by John N. Brooks as principal assistant; construction was directed by Charles E. Wells, and Robert Wheelwright was city planner.

The executive and designing work was done in the New York office of Hill & Ferguson. The field office under Mr. Wells was organized as follows: Mr. Wells had under him two assistant resident engineers, T. C. Atwood in charge of construction, and Otto Ten Eyck in charge of the office force. Reporting to Mr. Atwood were the several department heads as follows: F. G. Bennett topographic engineer in charge of topography, location and grades; H. A. Coussirat, engineer in charge of sewers; J. A. Ryan, engineer in charge of water supply; L. F. Duke, engineer in charge of electrical work; F. C. Breiby, engineer in charge of building construction; H. J. Atticks, engineer in charge of plumbing and heating, and F. B. Huntington, chief inspector of materials. To each of these department heads were allotted a sufficient number of assistants and inspectors to properly oversee the work. Reporting to Mr. Ten Eyck were the office engineer, F. K. Stebbins; the chief draftsman, L. C. Henderson, in charge of field drafting; the stenographic bureau, and the material-accounting bureau, in charge of William Briscoe. The material-accounting bureau kept track of all bills of materials, orders, the arrival of materials, amount on hand, etc.

The supervising engineers used as their field office one of the residences already existing upon the ground, while another was occupied by the contractor and a third by the quartermaster's department, these three being comparatively close together. Each of these contained telephones, and as construction was begun in each section of the camp, a temporary contractor's office was erected and provided with a telephone so that each part of the work was connected by telephone with each of the three offices, and these in turn were connected with the New York offices. Automobile runabouts were used for carrying the engineers, superintendents, etc., from one part of the area to another, and every other modern facility was employed for speeding up the work except that of working both night and day gangs. The hours for the engineering force were from eight in the morning to six at night, but it was not at all uncommon for a greater or less percentage of the force to work until nine or ten o'clock in the evening, and Sunday work was found necessary by the engineers during the entire period of construction to permit them to catch up with their work.

The entire work was in charge of Major D. G. Stivers, Q. M. C., Mont. N. G., A. Q. M., U. S, A,, who reported directly to General I. W. Littell, in charge of cantonment construction in Washington. Major Stivers was the government representative on the ground and all plans had to be approved by him and orders for materials of all kinds were issued by him on requisition made by the engineer or contractor. The constructing quartermaster had reporting to him, in addition to the supervising engineer, MacArthur Bros. Company, the contractors, and the division auditor, Alfred Rose, who had charge of all the construction accounting and the issuance of all vouchers and warrants for the payment of the work. Representatives of engineers, quartermaster, contractor and auditor were constantly on the ground, and every facility, including telegraph, long distance telephone, and other time savers were utilized to expedite the work, so that no delay was occasioned by this system of control.

It is evident from the celerity with which the work was done that there must have been the greatest harmony between departments and also the most admirable systematizing and coordination of all branches of the work by quartermaster, engineers, contractor and all others concerned.

OFFICERS' QUARTERS, SEPTEMBER 11TH.
Three weeks after the contractor began work.

ANOTHER LIBERTY BOND CITY.

We are informed by city clerk J. G. Crawford that Franklin, Pa., can be added to the list of smaller cities that have bought Liberty Bonds. This city has taken $7,000 of the first issue and $5,000 of the second, and expects to subscribe to the third issue when that is offered.

MOTOR TRUCKING, PITTSBURGH TO NEW YORK.

Steel is being brought from Pittsburgh, Pa. to New York City by motor truck, not a few loads only as an emergency measure, but as a regular practice because of the freight congestion on that route. The material so carried is for the construction of the subways in New York, the completion of which has already been delayed five or six months by war conditions. Freight congestion was not the only condition causing delay, the federal government having taken for war purposes material completely fabricated for subway purposes and ready for shipment. It is a sign of the times that large quantities of steel can be brought by motor truck over this 450-mile route without prohibitive cost.

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Change of Address.

Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

A TEST OF WAR TRUCKS—AND ROADS.

The War Department last week announced that it is its intention to send to the seaboard under their own power the 30,000 army trucks that are now under contract in Toledo, Indianapolis, Dayton, Cleveland and several other cities. The first 30 are believed to be under way at the time this is being written and will probably reach their port of departure before it is read. Each will carry a full load of munitions. This will not only relieve the railroad transportation congestion, but will train the drivers, test out the trucks, and demonstrate to the public the possibility of carrying merchandise to shipping terminals over long distances.

We have little doubt about the trucks standing the test—but how about the roads? About 2,000 miles of roads will be used by these trucks, and it is stated that a part of this distance must be reconstructed to stand this use, while 50 per cent must be put into proper condition, and all must be kept so by careful attention. The War Department will cooperate with the states in this work, and we thus see two thousand miles of road classed as a "war necessity."

But the "Food Department" has an equally important transportation problem; for food is even more necessary than munitions "over there," and is the most important problem at home. Why should not it also map out routes necessary for food transportation and make them also war necessities? They are even more essential than the war truck routes, for many of them must carry food from districts that are not reached at all by railroads. We are learning by costly experience what it means for the railroads to fail under the increased service demanded of them. Will we have to suffer even greater inconvenience from highway insufficiency before the authorities will awake to the fact that within certain limits—and by no means narrow ones—the upkeep and construction of roads is even more important than the construction of munitions?

SNOW AND STREET TRAFFIC.

Through a large section of the country an amount of snow has fallen which is unusual for so early in the winter. It suggests the desirability of the adoption by all cities of any size, and especially by those in which the interruption of street traffic would interfere with the forwarding of war supplies, of some method of alleviating as far as possible the interference with traffic caused by the snow on streets and sidewalks. In a few of the larger cities, the snow is removed entirely from the main thoroughfares as rapidly as possible; but even in these, the interference during the one to four or five days required for cleaning the roadways is often a serious matter.

In these large cities, as described by us several times within the last two or three years, the use of the snow plow has been found to be of great advantage in clearing at least a sufficiently wide section of the roadway to permit the free passage of two lines of traffic, one in each direction; the snow removed therefrom being pushed into a winrow either in the center of the street or one on each side. The latter plan prevents vehicles drawing up along the curb and shuts off access from the roadway to stores or other buildings, for which reason the middle winrow is better for retail commercial districts. The expense of this is not considerable, and we would suggest that many of the smaller cities might find it desirable to treat their main streets in the business districts in this way after each snow storm. After the heavy storms, the collecting of garbage and ashes is rendered very difficult by the heavy going, and but little time would be lost if the teams or motor trucks used in making the collections were withdrawn from this service for one day and used for operating snow plows in the way suggested.

There is another use of the plow which, so far as we know, has not been adopted by any city, but which suggests itself to us as worth a careful trial. An inspection of almost any street other than a main thoroughfare after a heavy snow-fall will show that practically all vehicles are following in the single trackway made by those which first passed through the street after the snow-fall, and that the automobiles are quite generally provided with wheel chains. We therefore have the roadway subjected to a concentration of all traffic wheels on two strips, each about six inches wide, some of these wheels being made still more destructive by the chains thereon. It is no wonder, therefore, that, after the passing away of the snow in the spring, the roadway shows that the winter traffic, although less in amount than the summer traffic, has done very much more damage to the roadway by wearing ruts into it; ruts frequently so deep that the entire roadway must be repaired if it is to be put into good condition again. If winter traffic could be compelled to spread itself more generally across the road, much of this damage could be prevented. This distribution of traffic might be effected by passing a snow plow over the street once every day or two while the snow is on it in such a way as to fill in the ruts, and even to bank the snow above the ruts so as to discourage the running of wheels along them. In addition, this would keep the roadways in better travelling condition for the same reason that the drag scraper used on a rutted

road produces this result. Such use of a few snow plows (one or two in a small city would be sufficient), drawn by the horses which are regularly used in street cleaning or other services which are interrupted by the snow, would add little to the expense of the street department for either plant or operation.

A further use of the snow plow and of horses otherwise idle which has been adopted by several cities (and which practice is, we believe, increasing) is the opening up of sidewalks. Property owners are of course expected to clean the sidewalks, but are usually allowed 12 to 24 hours to do so, while in practice several days elapse before all walks are cleaned. It would be to the great convenience of a large percentage of the citizens if snow plows were used early each morning on the sidewalks of the principal pedestrian thoroughfares. If it is argued that this gives an advantage to property owners along such thoroughfares by cleaning their sidewalks and not those on other streets, this might be met by charging a certain amount against the frontage of all such property for such sidewalk cleaning, on the same principle that such charges are made in some cities for sprinkling the streets in summer. One horse and plow can easily put into passable condition one and one-half or two miles of sidewalk in an hour; and by starting by 6 o'clock in the morning, could thus clean three or four miles of sidewalk before the citizens start for business along these main thoroughfares.

MUNICIPAL WORK AND WAR NECESSITIES.

Efficiency is a matter that has been much talked about during the past five years and much has been done to introduce it into all branches of industry. But heretofore efficiency has generally meant the obtaining of the maximum result from the minimum amount of wages paid. If a man was not satisfactorily efficient, he was discharged. Efficiency now must proceed along somewhat different lines. Labor has become scarce and it is not so easy to replace unsatisfactory employees with those that are more efficient, and more effort will need to be used to increase the efficiency of those we already have.

Some men are inefficient because they will not be, other because they cannot be; and many are of the opinion that the proportion of the latter to the former is increasing, since so many of the more efficient are being absorbed by the army. Among the causes of constitutional inefficiency, and many claim the most important of these, is poor health and low vitality. To the extent that these are inherited, little can be done to remedy them this year or before the end of the war; but in so far as they are occasioned by inadequate food or unsanitary or otherwise unfavorable surroundings, an immediate improvement should be possible; at least, we can prevent any deterioration in conditions leading to such results. A very large percentage of our citizens live in cities, and it follows that the sanitary condition of our cities becomes even more important now than it has been in the past.

If the maintaining and even the improving of such municipal conditions is recognized as a war necessity, then there can be no escaping the conclusion that a certain amount of municipal work is as essential to the winning of the war as the manufacturing of munitions or the raising of food. It is easily demonstrable that two efficient laborers will turn out as much and better work, with a less amount of invested capital in the form of machinery and other plant, than will three inefficient ones. If, therefore, by removing from those who are laboring directly upon war munitions and food only 5 per cent of those now employed, we can increase by one-third the efficiency of the remainder, we have increased by more than 25 per cent the output possibilities of existing labor.

It cannot of course be claimed that improving municipal conditions will increase by this percentage the efficiency of *all* laborers, or even of half of them; but on the other hand we are convinced that if conditions are allowed to deteriorate, the output of all will suffer from lowered vitality and general inconvenience more than is generally realized. England has had three years more experience of war conditions than has the United States, and in a lecture by one of the most prominent of its municipal engineers, H. Percy Boulnois, a few weeks ago, this authority placed emphasis upon the importance of continuing municipal work. Among other things, he stated that a bad road is an unsanitary road, as both mud and dust are detrimental to public health; and for the same reason, street cleaning is essential, and the removal of house refuse. War conditions have also thrown unusual burdens upon the sewerage system and sewage disposal plants, both by increasing the number of men employed in those sections where munition factories were most numerous, thus making necessary the extension of sewerage and water supply systems, and also by the enormous increase of trade wastes that are discharged into the sewers and generally tend to cause deposits and over-burdening of the capacity of them and also interfering with the treatment of the sewage in existing plants as well as over-burdening such plants. In spite of which, the efficiency of the sewer systems must be maintained.

The value of numbers of efficient laborers was never so great as now, and nothing is being done in this war which seems to be more important than conserving and improving the health of all who are remaining here as well as of those who will within the next year or two be sent to the other side for strenuous fighting. Great stress has been laid upon the enormous improvement made in war sanitation within a few years. During the Boer War there were 17 cases of disease in the English army to one case of wounded men, while in this war these figures have been almost reversed. It has been stated time and again that this is a war in which the workers are as important as the men on the battle-front; it therefore must be equally as important that we conserve the health of those at home as carefully as we have that of those in the field.

Reduction in amount of municipal work will undoubtedly be necessary, but it is more than ever the duty of municipal officials to see that no work is allowed to be suspended or left unperformed which is essential to the physical well-being of the community. This means that sewers must be built where there are houses to be sewered; water distribution systems must be extended and pumping and other facilities increased where there is an increase in population; streets must be kept in repair and kept clean ; refuse must be removed from inhabited districts and disposed of in a sanitary manner; building departments must be maintained to insure that new buildings conform to the building regulations and that the condition of old ones be maintained; boards of health must continue their oversight of the sanitation and food of their communities; and in a score of other directions the city must continue to perform those functions which are essential to the health and vital energy of all its inhabitants—men, women and children. Men and women, for they are all needed in our industries; children, for they will in a very few years be so needed. And this refers to the poorer quarters as well as those in which the wealthier reside, for from the former we must draw their quota of healthy, vigorous soldiers as well as

laborers. No unnecessary municipal work should be carried on from now until the war is won; but the most serious consideration should be given to the decision as to what work can be omitted as unnecessary to the physical well-being of the millions whose health and lives are in the keeping of municipal departments and officials.

WASTE-PAPER COLLECTION IN GLASGOW.

In 1900 Glasgow established a cleansing department for collecting the city refuse and utilizing waste products. One of the principal branches of this department is devoted to the collection of waste paper. During the past ten years the city has profited to the extent of nearly $44,000 from the sale of the waste paper, the revenue from this source in 1907-8 having amounted to $3,010; in 1908-9, to $3,120; in 1909-10, to $4,215; in 1910-11, to $5,725; in 1911-12, to $4,765; in 1912-13, to $2,315; in 1913-14, to $2,675; in 1914-15, to $2,950; in 1915-16, to $1,360, and in 1916-17, to $13,590.

The collection of waste paper from the city offices, warehouses, and better-class dwellings was originally introduced, apart altogether from the financial phase, with a view to curbing as far as possible the nuisance inseparable from the removal of paper from the public streets and in order to get hold of the material before it reached the dust bins and ash buckets. Bags for holding the paper, measuring 32 by 40 inches, are issued to business premises, etc., and are called for regularly by employees wearing a departmental armlet. The contents of these bags are emptied into larger receptacles for removal to the paper mills. By means of this system the paper is not only kept off the streets, but, being collected separately from the refuse, it forms a marketable commodity and becomes a source of revenue, as set out above.

In view of the Government's prohibition of the import of wood pulp, and consequent scarcity and increased value of waste paper, steps have been taken by the local city officials to collect waste paper on a much more extensive scale, even to the extent of salving all material picked out of the refuse at the various city garbage plants. The department is receiving valuable assistance from an organization known as the Women's Volunteer Reserve, the members of which engage in a door-to-door collection in certain districts of the city. In return for the services thus rendered the organization receives 20 per cent of the revenue derived from the paper so collected. An effort is also being made to reach the dwellings of the working classes through the medium of the school boards and pupils.

The service in this city is absolutely free. No charge is made for the use of the bags or for carting the paper away. All waste paper is sold, at Government-controlled prices, to paper-stock merchants in the condition in which it is collected. The total quantity collected and sold during the past fiscal year was 835 tons, the revenue realized therefrom amounting, as stated, to $13,590. It is interesting to note that about ten times as much paper was collected during the past fiscal year as during the preceding one. For the first three months of the current financial year 342 tons were collected, with a total value of $11,155. It is reliably estimated that the total value of the paper collected during the present financial year will reach $50,000.

OREGON HIGHWAY WORK.

The Oregon State Highway Department reports that during 1917 it laid by force account a little over two miles of concrete pavement at a cost of $1.72 per square yard, the pavement being 16 feet wide. At the beginning of the season a contractor had offered to do the work at 15 cents a square yard less, but the work cost more than was estimated because of the difficulty of obtaining material promptly and the scarcity of labor.

Within a few weeks the commissioners have bought a paving plant for $13,500 for the purpose of doing a considerably greater amount of work by force account during 1918. This will not, it is believed, enable it to do all the road work, one commissioner stating that ten plants would be necessary for this.

NEGLECT OF SEWAGE TREATMENT PLANTS.

Last summer J. H. Dunlap, associate professor of hydraulics and sanitary engineering at Iowa State University, investigated the municipal water, sewerage and sewage treatment plants in the state of Iowa. In the 2,300 cities, towns and villages he found about 450 water works plants, 180 sewerage systems and 100 sewage treatment plants. Regarding the sewage treatment plants he reported: "Of the thirty-seven plants visited only three can be said to have been in good condition. All three of these plants had features needing immediate attention, but in general they were giving excellent results. The other thirty-four plants were either not being operated properly or were so badly overworked as to make first class operation impossible."

FIRE APPARATUS MILEAGE

Mileage Made During the Year by Each Kind of Motor Apparatus—In Each of Several Hundred Cities and Averages of All.

The mileage of fire apparatus in several hundred cities, as reported by fire chiefs, is given in the table published last week and this. The mileage reported by the several citise and villages varies enormously, the least being 5 miles (probably occasioned by only two or three fires during the year), while the maximum reported was 35,000 miles for a chief's car (an average of nearly 100 miles a day) and several exceeded 10,000 miles. These figures seem very high, but we give them as reported.

We have calculated the averages for each kind of apparatus, and in the accompanying table give these averages, the number of cities whose figures are included in the calculation, and the maximum and minimum figure reported.

Next week we will give tabulated figures of the miles run per gallon of gasoline by each piece of apparatus, as reported by each of the cities.

Mileage of Different Kinds of Apparatus.

Averages of all cities reporting.

Kind of Apparatus.	No. of cities averaged.	Mileage run—Average	Mileage run—Maximum	Mileage run—Minimum
Chiefs' cars	99	5,151	35,000	15
Chem. & hose with ladders	156	315	1,500	15
Chem. & hose without ladders	49	420	4,000	15
H. & L. trucks	91	345	3,000	6
Triple combinations	66	358	1,800	30
Hose wagons	51	380	3,000	10
Tractors	22	242	9,000	100
Chemical engines	21	561	3,000	25
Gas-pump engine & hose	55	394	4,000	65
Gas-pump engines without hose or chem.	12	317	800	65
Gas-pump engine with chem.	8	328	600	150
Gas-driven steam pumper	15	213	800	5
Fuel or service wagons	9	1,835	7,500	75
Repair wagons	11	3,114	11,000	200
Squad wagons	11	838	2,500	75
Water towers	3	66	92	25

AVERAGE MILEAGE PER YEAR MADE BY MOTOR APPARATUS (Continued).

City and State.	Chief's Cars.	Chemical & Hose With Ladders.	Chemical & Hose Without Ladders.	H. & L. Trucks.	Triple Combinations.	Hose Wagons.	Tractors.	Chemical Engines.	Gasoline Pumping Engine & Hose.	Gasoline Pumping Engine Without Hose & Chem.	Gasoline Pumper With Chem.	Gasoline Driven Steam Pumper.	Fuel or Service Wagons.	Repair Wagons.	Squad Wagons.	Water Towers.
New Mexico:																
Raton	1,500	....	500	....	....	....	....	....	....	....	....	....	....	....	....	....
Roswell	5,000	650	....	....	....	500	....	....	....	....	....	....	....	7,000	....	....
New York:																
Auburn	225	175	....	175	....	....	....	....	....	....	....	....	....	....	....	....
Batavia	....	60	....	60	....	....	....	....	....	....	....	....	....	....	....	....
Canastota	....	40	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Cohoes	2,500	200	200	250	175	....	100	....	175	....	....	100	75	....	....	....
Corning	....	....	350	....	250	....	....	....	....	....	....	....	....	....	....	....
Freeport	....	75	....	....	....	....	....	....	....	....	....	75	....	....	75	....
Fulton	....	....	125	....	125	....	....	....	....	....	....	....	....	....	....	....
Geneva	150	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Johnson City	3,600	....	200	150	....	700	....	....	....	....	....	....	....	....	....	....
Liberty	....	100	....	....	....	100	....	....	....	....	....	....	....	....	....	....
Mamaroneck	....	300	300	300	300	300	....	....	300	....	....	....	....	....	....	....
Mechanicsville	....	75	....	....	....	75	....	....	....	....	....	....	....	....	....	....
New Rochelle	2,100	1,415	....	177	537	....	....	....	....	....	....	24	....	....	....	....
Peekskill	200	....	200	150	....	....	....	....	175	....	....	....	....	....	....	....
Rye	....	350	....	100	....	150	....	....	....	....	....	....	....	....	....	....
Silver Creek	....	....	....	....	....	12	....	....	....	....	....	....	....	....	....	....
Watkins	....	....	100	....	....	....	....	....	....	....	....	....	....	....	....	....
White Plains	750	120	....	6	....	....	....	....	....	....	....	....	....	....	120	....
Yonkers	3,033	....	676	676	....	....	....	....	676	676	....	....	....	4,300	....	....
North Carolina:																
Durham	6,000	400	....	600	....	....	....	....	....	....	....	....	....	....	....	....
Raleigh	1,000	700	....	675	....	....	....	....	75	....	....	....	....	....	....	....
Ohio:																
Akron	3,000	700	500	300	400	....	400	....	....	....	....	....	7,500	5,000	....	....
Alliance	2,000	100	....	....	300	....	....	....	....	....	....	....	....	....	....	....
Bellaire	....	200	....	....	200	....	....	....	....	....	....	....	....	....	....	....
Bryan	1,275	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Columbus	3,800	292	292	292	292	....	292	....	....	292	....	....	292	292	....	....
Conneaut	....	....	....	....	250	250	....	....	....	....	....	....	....	....	....	....
East Cleveland	6,000	300	....	300	300	....	....	....	300	....	....	....	....	....	....	....
Elyria	1,800	....	....	150	....	....	....	....	225	....	....	....	....	....	....	....
Findlay	2,500	....	....	....	....	....	....	45	....	....	....	....	....	....	....	....
Jackson	....	....	....	....	45	....	....	....	....	....	....	....	....	....	....	....
Lakewood	4,065	608	....	394	....	....	....	....	466	....	....	....	....	....	....	....
Lima	500	180	....	....	....	....	100	....	....	125	....	....	....	....	....	....
Marietta	....	150	....	....	175	....	125	....	....	....	....	....	....	....	....	....
Mt. Vernon	1,000	100	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Portsmouth	25,000	....	....	375	350	....	....	....	300	....	375	....	....	....	....	....
Springfield	1,000	500	....	500	....	....	....	....	500	....	....	100	1,000	....	....	....
Toledo	2,798	....	430	548	124[1]	....	....	....	....	....	....	240	2,000	....	....	80
Warren	6,000	200	....	....	200	....	....	....	....	....	....	....	....	....	....	....
Youngstown	5,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Oklahoma:																
Ada	....	300	....	....	230	....	....	....	....	....	....	....	....	....	....	....
Chickasha	100	....	....	....	60	....	....	....	....	....	....	....	....	....	....	....
Miami	....	....	108[2]	....	....	....	....	....	....	....	....	....	....	....	....	....
Oregon:																
Astoria	4,000	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Roseburg	1,000	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Pennsylvania:																
Altoona	3,000	200	....	....	....	....	....	....	....	....	....	100	....	....	....	....
Bangor	....	....	....	....	100	....	....	....	....	....	....	....	....	....	....	....
Beaver Falls	4,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bradford	....	....	....	....	....	....	....	50	....	....	....	....	....	....	....	....
Carlisle	....	15	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Duquesne	....	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....
Easton	....	100	....	....	350	....	....	....	....	....	....	....	....	....	....	....
Franklin	250	250	....	100	450	....	....	....	....	....	....	....	....	....	....	....
Galeton	....	....	20	....	....	....	....	....	....	....	....	....	....	....	....	....
Girardville	....	250	....	....	....	200	....	....	....	....	....	....	....	....	....	....
Oil City	2,500	....	....	....	....	800	....	....	....	....	....	....	....	....	....	....

Philadelphia	2,500	100	148	169	....	....	148	....	148	....	....	....	....	1,654	....	92
Quakertown	....	....	....	....	....	....	....	....	530	....	....	....	....	....	....	....
Reading	12,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Turtle Creek	....	....	....	....	1,800	....	....	....	1,800	....	....	....	....	....	....	....
Tyrone	....	400	....	400	....	....	....	....	....	....	....	....	....	....	....	....
Warren	....	90	....	80	....	50	....	....	....	....	....	....	....	....	....	....
West Berwick	....	....	....	....	30	30	....	....	....	....	....	....	....	....	....	....
Rhode Island:																
Woonsocket	5,000	550	....	450	....	....	....	....	....	....	....	....	....	....	....	....
South Carolina:																
Charleston	5,000	700	.. ..	....	....	....	....	....	300	....	300	....	....	....	....	....
South Dakota:																
Madison	15	15	15	....	....	....	....	....	....	....	....	....	....	....	....	....
Tennessee:																
Clarksville	....	....	1,000	....	....	....	....	....	....	....	....	....	....	....	....	....
Jackson	....	300	....	....	300	....	....	....	....	....	....	....	....	....	....	....
Johnson City	....	185	....	....	215	96	....	....	....	....	....	....	....	....	....	....
Nashville	6,000	....	....	....	360	....	250	....	....	....	....	....	....	....	....	....
Paris	....	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Texas:																
Amarillo	3,500	350	....	25	....	....	....	....	300	....	....	....	....	....	....	....
Austin	5,000	....	200	200	....	....	....	....	....	....	....	....	....	....	....	....
Denison	5,000	....	....	3,000	....	3,000	....	....	4,000	....	....	....	....	....	....	....
Georgetown	35,000	1,000	1,000	1,000	....	1,000	....	1,000	....	....	....	....	....	....	....	....
Houston Heights	500	....	500	500	....	500	....	....	....	....	....	....	....	....	....	....
San Marcos	1,600	600	....	....	600	....	....	....	....	....	....	....	....	....	....	....
Victoria	2,000	500	600	500	....	....	....	....	....	500	....	....	....	....	....	....
Utah:																
Logan	1,000	....	200	....	200	....	....	....	....	....	....	....	....	....	....	....
Ogden	2,500	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Salt Lake City	6,300	500	....	250	600	500	250	....	700	....	600	....	....	11,000	800	....
Vermont:																
Bellows Falls	....	200	185	....	....	90	....	....	....	....	....	....	....	....	....	....
St. Johnsbury	....	....	200	100	....	20	....	....	....	....	....	....	....	....	....	....
Virginia:																
Charlottesville	....	....	300	300	300	200	....	....	....	....	....	....	....	....	100	....
Covington	....	105	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Harrisonburg	....	....	300	....	....	....	....	....	....	....	....	....	....	....	....	....
Newport News	3,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Roanoke	....	700	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Washington:																
Bellingham	2,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Ellensburg	....	500	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Olympia	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Puyallup	500	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Seattle	6,500	....	....	375	....	545	240	600	65	....	....	145	5,125	....	685	....
Tacoma	1,000	350	....	350	....	....	....	....	300	250	....	300	....	....	....	....
West Virginia:																
Elkins	....	400	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Fairmont	500	125	....	75	....	....	....	....	....	....	....	....	....	....	....	....
Wheeling	....	106	....	115	....	....	....	....	....	....	....	....	....	....	....	....
Wisconsin:																
Appleton	1,500	....	....	175	....	200	....	....	....	....	....	....	....	....	....	....
La Crosse	1,377	300	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Manitowoc	1,600	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....
Merrill	....	110	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Milwaukee	3,022	371	....	410	....	....	....	....	....	....	....	....	....	....	....	....
Oshkosh	2,000	275	280	270	....	665	323	....	439	....	....	....	....	2,680	408	....
Rhinelander	....	200	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Superior	5,000	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Canada:																
Westmount	....	750	....	....	....	....	.. ..	....	500	....	....	....	....	....	....	....

[1]Aerials; [2]blocks.

The WEEK'S NEWS

Meeting Road Problems in Wisconsin and Oregon—Federal Test of Highway Freight Service—Child Welfare Work in Massachusetts—Philadelphia's Sewage Disposal System—Water Waste in Washington—San Francisco Fights Water Company for Impounded Funds—Pittsburgh's Street Lighting Contract—Difficult Fires in Jersey Shore, Pa., Fresno, Cal., Punxsutawney, Pa., and Attleboro, Mass.—New York's Bomb Squad in U. S. Service—New York State Public Service Commission Grants Six-Cent Fare—The San Francisco Car Strike.

ROADS AND PAVEMENTS

Delay Road Building Program.

Madison, Wis.—The special legislative committee which was appointed to make an inquiry into the question of building trunk line wagon roads through the state, and to recommend routes for those roads, has completed its hearings. It has held sessions in every county seat in the state, and routes for the trunk lines are being prepared under its direction. The committee has decided not to use the state good road fund, or the federal aid which is to be granted for the building of roads for any great amount of new road building during 1918, and only trunk line work will be done where it can be accomplished by the building of connecting lines between existing roads. The decision to limit building operations the coming year is due to the high cost of material and the scarcity of labor. When the road building work is really begun, the first road constructed will be directly across the state from east to west, and the road will run eventually from Milwaukee to Prairie du Chien, via the state capitol and Richland Center. There are to be eventually two roads to Madison. Road building work is to extend eventually all over the state, and trunk lines are to be built connecting all the county seats in the state. The committee recommends that considerable money be expended in the maintenance of the state roads already built, and that these roads be put in good repair, and be kept in the best state of repair possible.

Highways to Relieve Railroads.

Washington, D. C.—Major-general Henry G. Sharpe, the quartermaster-general, has announced that the first section of the American Army's new experimental truck transport service has started from Detroit on its way to the Atlantic seaboard. The test is being made in an effort to relieve congestion in freight terminals by the overland use of motor trucks under plans worked out by the quartermaster department and the Highways Transport Committee of the Council of National Defense. If the plan proves successful it is expected that the total relief to the railways through the shipment to the coast under their own power of 30,000 war trucks will amount to 690,000 tons. The trucks have an average capacity of three tons, and only two of them can be shipped by rail in a forty-ton freight car. The new plan will therefore relieve 15,000 freight cars, and will also permit the transportation of 90,000 tons of government materials to the coast from the interior storage depots. Thus 17,250 forty-ton cars may be released. The plan is expected to serve also an urgent need—that of providing adequate opportunity for the training of an effective corps of transport drivers and officers. "Working in close touch with the storage committee of the Council of National Defense, which is helping to work out the efficient mobilization of the varied stores of war at convenient central points, the Highways Transport Committee is laying out a comprehensive system of through routes between the truck production centers, the storage centers and Atlantic Coast ports. The routes which are being selected are those which can most easily and clearly be brought into condition to stand the traffic, and which will lead most directly from the truck production centers to the seaboard. A central main line or backbone military highway will be selected between Chicago and New York City, and leading to this main line feeder routes from the various scattered motor production centers. In the east branch routes will lead off the main line north and south to the various Atlantic coast ports. Officers of the quartermaster department have been for months gathering detailed information in regard to the roads, and the possibility of heavy motor truck traffic over them. On most of our through routes of traffic in this country the government has been confronted with more or less extensive gaps, which are now improved to an extent, allowing heavy truck traffic during the winter months. State and county officials have been called to Washington, and are urged as a patriotic duty in the war emergency to bring the local gaps immediately into suitable condition. The Highways Transport Committee has called upon the various highway authorities for co-operation in the important work of laying and selecting the various routes, and determining upon the points where construction must be accomplished before heavy motor truck transportation is possible. Late in November engineers, representing the Office of Public Roads of the Department of Agriculture, and the Corps of Engineers, United States Army, left Detroit, spent ten days in selecting the most feasible route between Detroit and an Atlantic Coast port. Army officers and war department officials will watch the results of the first motor company's drive of 600 miles with keen interest and upon the success of this trip will depend the extent to which motor truck transportation on the part of the government will be developed. In each state the inspection party was accompanied by a representative of the state highway department, who noted the locations of those sections of route requiring immediate improvement, and action on the part of the states and counties to remedy unsatisfactory conditions has been urged by the Council of National Defense. As the plan develops and is carried to its logical development there will be many ways in which local organizations can assist. Federal routes should be marked in such a way that they can be easily followed by the truck company commanders, even though they will be provided with detailed maps. Arrangements can be made for right of way through any congested centers and a system of expeditious delivery of supplies, gasoline and oil can be worked out. Local bodies can keep commanders of the motor truck companies advised a day in advance, by telephone or wire, of the weather conditions and their possible effect upon the roads so that all precautions may be taken to avoid delay. Altogether, a real opportunity will be provided for definite service to the government, to the public and various civic and commercial organizations along the line, who can, in a hundred ways, aid in making the government's transport service efficient and successful."

Highway Commission Buys Railroad Cars.

Salem, Ore.—With its own paving plant complete, the highway commission will be in position next season to lay about 15 miles of hard surface. In addition to a second-hand plant, bought for $13,500 from the Oregon Independent Paving company, the commission has purchased one second-hand five-ton roller and two 10-ton rollers, one of them new. The big stroke of the commission was in buying nineteen cars from the United States reclamation service for $1,000 each. Owing to the rule of the government that open cars cannot be used for highway material, the commission decided to prosecute its work by purchasing cars of its own and these the railroads will haul. With

them the commission will start as soon as possible shipping crushed rock to the jobs that are to be worked next season, and by having a large accumulation of rock on hand, the jobs can be rushed through the summer without delays for want of material. These cars will also be used for carrying gravel for the Columbia River highway east of The Dalles, from points where there are inexhaustible gravel pits.

Discharges Whole Street Force.

New Haven, Conn.—The street department has discharged 170 men, practically the entire force under superintendent Niar Barnes, because there is no money left in the street account to pay their salaries. Extraordinary expenditures during the year, together with the increased cost of material and increased wages of employes is responsible for the low condition of the street account. There were several expenditures that arose during the year unforeseen when the 1917 budget was made. The board of finance will have to transfer money from some other account to pay for clearing snow away from the central streets after snowstorms during the month.

SEWERAGE AND SANITATION

Federal Health Survey of City.

Fort Worth, Texas.—A sanitary inspection of restaurants, hotels and all places where food and drinks are prepared and offered for sale is being made by assistant surgeon of the United States Public Health Service, A. R. Sweeney, and state pure food inspector Andy Byas. It will include all territory within five miles of Camp Bowie or the three aviation camps. According to Major Oakley, who is in charge of the survey, the work is thorough, and places which do not maintain proper sanitary conditions will not be permitted to sell to soldiers. A sanitary survey of the city is also being made under the direction of chief sanitary inspector E. W. DeGraff, which will include sewer connections, dry closets, etc.

Mayor Directs Health Work in Epidemic Emergency.

Webster City, Ia.—Under the manager law, which gives him the right in case of an emergency to govern the city by proclamation, mayor Clark has delegated to himself authority to place the city under his personal charge so far as all health regulations are concerned. He issued a proclamation declaring the prevalence of diphtheria here sufficiently alarming to constitute an emergency under the law. To meet this emergency mayor Clark and the board of health ordered that cultures be taken from all school children, and that after the culture is taken the child be ordered to remain at home until notified of release. Last month about thirty cases were quarantined in the city. In July there was one case, in August there were three, in September four, and in October fourteen.

Intensive Campaign for Child Life Conservation.

Boston, Mass.—An intensive campaign for the conservation of child life is being launched in Massachusetts by a special committee recently appointed by the commissioner of health, Dr. Allen J. McLaughlin. The members of this committee are authorities on child hygiene and are working in close co-operation with the division of hygiene of the state department of health. It is the purpose of this committee greatly to increase the conservation of child life throughout the state by demonstrating to the cities and towns the necessity for such work. This is being done by sending into the field child welfare supervisors—specially trained in public health nursing as well as child welfare work—to make a careful and comprehensive survey of every part of the state to discover what the actual health conditions are in the different localities. Supervisors have already been sent into the eight health districts of the state, and are working in conjunction with the local health officer and the state district health officer. The plan of the state committee calls for work to be established in providing prenatal care for expectant mothers, a plan which has been proved to have reduced the rate of infant mortality by one-half; for care of women during confinement and for care of the children up to five years. The committee does not expect to establish new agencies for child welfare work except where none exist, but to concentrate every effort on supporting existing agencies, thus extending and strengthening work already begun. The committee will also stimulate interest in the communities throughout the state to provide funds for the employment of trained workers to carry on this public health work. When the special problem of a city or town has been determined by these supervisors a definite effort will be made by the committee to prevail upon that city or town to provide funds to meet that need. As this is a state-wide movement, no town or city will be neglected. In order to carry out the plans of the state committee and to accomplish the best results in each locality, volunteer helpers will be used.

Finds Sanitary Menace in Boom Village.

Hamtramck, Mich.—"Immediate enforcement of the state housing code will go a long way toward solving the communicable disease problem in Hamtramck," according to Don W. Bingham, assistant state sanitary engineer, in reporting a survey of typhoid fever conditions in the village. The Detroit board of health requested the survey because the city now nearly surrounds the village. The state housing code is applicable to villages or towns of more than 10,000. Hamtramck had only 3,559 population, according to the 1910 census, but a special census in 1915 showed a population of 20,000, an increase of 563 per cent. The population now is estimated at 31,000. Regarding sewers, Bingham says: "There is a section of the village, comprising about one-quarter of the total area, whose only public improvement is city water. This parcel contains approximately 3,100 lots, of which 950 are occupied by houses. In this unsewered territory the majority of the 1917 typhoid fever cases have been located." In a history of the twenty-five recorded cases, all but seven of which were in a small unsettled portion, he shows the probable source of infection. Sanitary conditions in the unsewered section of the town are bad, Bingham says. Kitchen and laundry wastes and other sewage are drained into street gutters. Bingham recommends more prompt reporting of communicable diseases by physicians, a fly-tight garbage receptacle ordinance and the prohibiting of outdoor toilets in sewered districts. He urges the villages to employ an infant welfare nurse and recommends that two inspectors of the educational department of the Ford Motor Company be appointed special sanitary officers without pay. A trunk line sewer to take care of the unsewered portion of the village is being built, and the Ford inspectors have obtained signatures for petitions for lateral sewers among the 350 Ford employees affected.

Drinking Utensils Must Be Washed.

Sacramento, Cal.—Drinking cups and glasses used in restaurants, at soda fountains and other places must be washed five minutes in boiling water containing a 5 per cent solution of lye. This is included in new regulations promulgated by the California state board of health for the enforcement of the law governing the sterilizing of drinking utensils.

Progress on Philadelphia Sewage Disposal System.

Philadelphia, Pa.—With the completion of the Frankford Creek intercepting sewer, which the department of public works is pushing vigorously, Philadelphia, and especially the northeast section, will have a method of sewage disposal capable of caring for 275,000,000 gallons a day. This unit includes the northeast sewage treatment works, near the Delaware River; the grit chamber at O and Lycoming streets, and when completed will empty purified sewage two miles farther down stream than the present outlet, now at the mouth of the Frankford Creek and Delaware River, and a point two miles further removed from the intake of the Torresdale filtration plant of the water supply. The sewer is four miles long and is constructed of concrete, mostly in rectangular form, with an arched roof. The general width is eight and one-half feet, and in some places is as high as eleven feet. Behind the grit

chamber the sewer will consist of sixty-six-inch concrete "pipes" for a distance of 6,600 feet. At different points tunnels were made through solid rock, the longest being 1,300 feet. One section of the sewer is above the surface in order to insure the necessary fall. Odors in the sewer have been reduced by half, according to Chester M. Albright, chief of the bureau of surveys, who devised essentials of construction work. When completed the sewer will take over the sewage formerly discharged into the Frankford Creek. This sewage comes from Chestnut Hill and Germantown. The sewage is first carried to the grit chamber, then to the northeast treatment works and from there flows into the Delaware River. It has been estimated that at the present time the Wingohocking Creek discharges into the Frankford Creek about 30,000,000 gallons daily. Much of the area to be drained by this system is still to be built up, and in anticipation of a densely populated section in the future the entire system had been constructed with ample facilities for increased volume.

WATER SUPPLY

Much Waste of Capital's Water Supply.

Washington, D. C.—With some estimates of Washington's increase in population, due to the war, running as high as 50,000 the question of the sufficiency of the capital's water supply is again attracting the attention of officials. Investigation of the amount of water used last month shows an increase of 2,500,000 gallons in the daily mean consumption as compared with the record of November, 1916. Some officials are of the opinion that Congress either must take immediate steps to reduce water extravagance in government departments or provide for increasing the capital's water supply. It is stated that one of the largest departments is supplied through an eight-inch main, which is not metered, and that unquestionably a great deal of water is wasted by the government. The present water supply system is estimated to be sufficient for a population of 500,000 people. At the beginning of the last fiscal year the water department based its calculations on a population of 369,000, but if some estimates are right the number of persons living in Washington now is somewhere in the neighborhood of 420,000. It is estimated that federal buildings and plants waste 4,000,000 gallons of water daily. The department will continue its work, prosecuted so successfully during the past year, of locating and stopping leaks. It detected last year underground leakage from service pipes, mains, etc., of 1,752,600 gallons a day. More than 150 miles of mains were tested, and the underground leakage from street mains was found to amount to 273,500 gallons a day.

City May Take Water From Private Wells.

Ann Arbor, Mich.—The city's proposed pumping station, on the marshes three miles south of the city, will be operated for the purpose of taking water for the city's consumption despite the fact that the taking of the water actually weakens flowing wells and dormant wells of farmers living nearby. So long as the city does not unreasonably make use of the percolating water in the gravel deposits under the marsh, and does not work injury to the other property owners it can go ahead, but if it does work injury and that injury is apparent, it must answer. Such, in substance, is the decision of the supreme court at Lansing in ruling on attempts of land owners in the marsh where Ann Arbor now gets its water to stop all proceedings with injunctions. The injunctions refused by the circuit court of Washtenaw county are refused by the high court, but at the same time notice is served on the city that it cannot go beyond the bounds of reason and by powerful suction drain nearby wells and injure agricultural land. Justice Ostrander, in the opinion, says:

"I have said that in view of the circumstances the right of the defendant, the city of Ann Arbor, to make use of the water is a qualified right. It is qualified by this rule of reasonable user. There is no apparent reason for saying that because defendant is a municipal corporation, seeking water for the inhabitants of the city, it may therefore do what a private owner of the land may not do. The city is the private owner of the land, and the furnishing of water to its inhabitants is its private business. It is imperative that the people of the city have water; it is not imperative that they secure it at the expense of those owning lands adjoining lands owned by the city. It does not follow that the city may not reasonably make use, for the purpose intended, of a large volume of water from this land. I have stated the rule by which the rights of the city and of the other land owners must be determined. Manifestly the city must take the chances of experience."

One Dead in Water Plant Explosion.

Lakefield, Minn.—The water and light plant here is destroyed as the result of an explosion. The plant blew up, killing Peter Nelson, engineer, and injuring three other men. The cause of the explosion is not known, but, according to a newspaper report, the boilers went dry. The blast shook the entire town.

The Spring Valley Impounded Funds Case.

San Francisco, Cal.—Final arguments in the well-known Spring Valley water rate cases involving $2,250,000 of impounded taxpayers' money have been concluded by assistant city attorney Robert M. Searls. Master H. M. Wright's decision turning over this large sum to the Spring Valley company and materially increasing the valuation of the company's properties is now in the hands of federal Judge Frank H. Rudkin for confirmation or rejection. Judge Rudkin indicated that a decision could not be expected before the first of the year. The city seeks a reversal of Wright's decision, to which it has taken 100 separate exceptions. Searls argued that the evidence introduced before Wright did not support his conclusions, and that he made grievous errors in both law and equity. Searls claimed that the rating basis adopted by Wright placing the value of the Spring Valley properties at $39,000,000 was at least $10,000,000 in excess of the company's original investment in all of its properties. Wright, in valuing the company's properties, included 40,000 acres of land for which the company paid $3,000,000, but which never was put to use in supplying the city with water. The original investment of the company, as shown by the city's witnesses before master Wright, Searls contended, in properties actually in use, does not exceed $22,000,000. On the question of law alone, Searls argued, and not considering the numerous instances where the master overruled witnesses on questions of fact, at least $10,000,000 should be taken off Wright's total valuation of the company's properties. This amount, Searls asserted, includes: "The value of 2,000 acres of land at Lake Merced. The value of 38,000 acres in Alameda county not required to supply the city with water. Two million dollars' enhancement in value of water rights, which the city contends never took place. Separate allowance for "going concern" value of $3,400,000, which Searls contended should have been excluded as a matter of law, and in support of which he cited numerous authorities. More than $2,000,000 as special value of reservoir sites, which the city contends do not exist. More than $800,000 for excess allowance for overhead charges given by the master upon the assumption that the engineering charges on Spring Valley work would be the same as on the New York-Catskill project." Searls further argued and cited as an authority the decision of federal judge Farrington in the last Spring Valley cases in 1903 that the minimum non-confiscatory rate should be placed at five per cent instead of at 7 per cent, as fixed by Wright. The company attorneys took exception to the city's position in the matter of even considering the original investment of the company in determining the present value of the company's properties. Exception was also taken to the refusal of the city to allow special value for reservoir lands, which Wright fixed at $1,200 an acre and which the city showed to have cost but little more than $200 an acre. Allowing for increased value the city's witnesses during the hearing before Wright appraised the reservoir lands at $320 an acre. The Spring Valley attorneys attacked the position of the city in the inclusion of water rights at original cost in the absence of a showing of any appreciation since they were acquired. The principal issue appeared to be over the right of the company to value its reservoir lands for water supply purposes, its watershed lands for residential purposes and its structures

at reproduction cost, and then to add to the total the value of water rights, which ownership of the lands and structures made it possible for the company to use in furnishing water to the city. The city's contention was that only riparian rights which the company had purchased from other land owners below the main diversion dams should be valued because the company would be required to purchase nothing further in order to affect its water deliveries. The attorneys also dwelt upon the risk run by the company through governmental control of its rates, and reviewed the evidence of its witnesses in support of a seven per cent return on its investment. In replying to this portion of the argument Searls showed that the seven per cent rate of return was supported entirely by expert testimony, given by bankers and brokers, and that the cost of money in the past was in practically every case less than six per cent and in most cases did not exceed five per cent. "If the master's report is confirmed by the court and fifty per cent added to the original investment, why should the Spring Valley Water company worry over the risk of governmental regulation?" asked Searls. Trial of the cases before master Wright consumed 152 days and 11,000 pages of testimony. Seventy-five witnesses were called and 235 exhibits introduced. Failure to obtain an order reversing the master's report will mean that the city will carry its fight to higher courts.

STREET LIGHTING AND POWER

Decides Against Zoning City for Gas Rates.

Los Angeles, Cal.—Los Angeles scored a victory in the gas rate fight when the state railroad commission granted the request of both Los Angeles and Pasadena that each be considered a complete zone or district for the purpose of fixing rates for gas furnished by the Los Angeles Gas and Electric corporation and the Southern California Gas company. Both Los Angeles and Pasadena objected to the division of their territory into different zones, and asked that a flat rate be established for each city. The railroad commission had fixed a base rate of 68 cents for the central part of Los Angeles in its original ruling, but other sections ranged as high as 85 cents. This decision, according to city attorney Stephens, the commission has now reconsidered. City attorney Stephens declared his opinion that the 68-cent rate should be fixed for all Los Angeles proper, and that this could be urged later, if the commission does not make an immediate ruling. The rate at present is 68 cents, and Stephens said he did not think it should be changed until the natural gas rates are fixed. Pasadena was given a base rate of 75 cents for most of its territory in the first rate ruling of the railroad commission, and 80 cents in the balance. A flat rate of 75 cents for all Pasadena is believed to be indicated by the commission's new ruling.

Allow Increased Gas Rates.

Morgantown, W. Va.—The state public service commission has allowed an increase in gas rates in this city and vicinity to the West Virginia Traction and Electric Company which is engaged in gas, electric, street car and water service principally in Morgantown and Wheeling. The rates previously in effect were: Domestic consumers, per 1000 cubic feet, 20 cents; commercial consumers, under five million cubic feet per month, 20 cents; between five and 10 million cubic feet, 12 cents; over 10 million cubic feet, 10 cents. The new rates requested for both domestic and industrial consumers were: For the first 250,000 cubic feet per month, 25 cents; for the next 250,000 cubic feet, 20 cents; for the next 250,000 cubic feet, 17 cents; all over 750,000 cubic feet, 15 cents. The rates authorized to be put into effect, deemed by the commission "to be just and reasonable," are: For the first million cubic feet, 20 cents; for the next million cubic feet, 18 cents; for the next three million cubic feet, 16 cents; for all over five million cubic feet, 13 cents. After considering valuations of the property of the company made by engineers for both sides, the aggregate was placed at $853,914.38. "The applicant is entitled," decided the commission, "to receive a rate sufficient on this value as fixed by the commission to provide for depreciation, pay the costs and expenses of operation and repairs, taxes, and a fair rate of interest. Taking into consideration the amount of reserve territory owned by applicant and the probable value of its property when all of its territory shall have been completely developed, it is the opinion of the commission that an annual fund of eight per cent, or $62,840, is amply sufficient as a depreciation charge.

"The operating expenses of said company for 1914 was $51,089.59, for 1915 $79,952.82 and for 1916 $115,618.18, and it is claimed by applicant, and not seriously objected to by protestants, that it should be allowed the sum of $120,000 annually for operating expenses, repairs and taxes. This sum would appear excessive were it not for the abnormally high cost of labor and supplies, but under existing conditions the demands may be justifiable and said sum is accordingly allowed.

"A net return of eight per cent on the value of applicant's property, or $62,840, to the stockholders and owners of same is believed to be a fair and reasonable return, and is the same rate that has been allowed by the commission in similar cases.

"This makes a total annual revenue of $291,480, which the company is entitled to collect from its consumers of gas. The total amount collected by it under the present rates in 1916 was $252,498.23. It is apparent that the present rates will not yield sufficient revenue to insure the company a reasonable return on the fair value of its property. Is the company entitled to the rates that it seeks to put in force? The large industrial consumers are not paying a high enough rate in comparison with that paid by the domestic consumers, and if it is possible for the company to make up the deficiency without their rates unreasonably high, it should be done without laying additional burdens on the domestic consumers. We believe that a sufficient increase in the return to the company may be had without increasing the rates to domestic consumers, and without granting all the increase requested from the industrial consumers.

"It might be noted here," said the decision, "that some of the largest industrial consumers of gas in Morgantown appeared at the hearings and stated that in their opinion the company was entitled to the increase requested by it."

New Contract for Street Lighting.

Pittsburgh, Pa.—The councilmanic finance committee has affirmed an ordinance for a contract with the Duquesne Light Company for electric street lighting for the first twenty wards of the city. It is for a term of 10 years, beginning January 1, 1917. Light for this year under it will cost the city $333,790. The cost under the old contract was $355,000 yearly, it is reported. The new contract, according to superintendent W. A. Donkin, who appeared before the committee, was based on $1.25 a ton coal and normal prices of labor and materials as prevailed in this city two years ago. He stated that the city will get better service under the new contract, it specifying that the light company furnish 500 better service lamps within six months, and 3,000 better service lamps, all that the city uses, within three years. He said that, if the materials can be got by the light company, better service lamps will be installed in all the twenty wards as soon as possible.

FIRE AND POLICE

City Lacks Apparatus to Fight Big Fire.

Jersey Shore, Pa.—Thirty-five families were made homeless and ten business establishments wiped out by a fire that swept the business section of Jersey Shore, causing a loss estimated at $500,000. With the temperature at zero and the ground covered with a foot of snow that a forty-mile wind piled in great drifts more than 100 persons were forced to flee from their homes, many of them clad only in their nightclothes. Lee Umstead, a fireman, was badly hurt in a fall from a ladder while fighting the flames. The fire, which started in a department store, was discovered shortly after four o'clock in the morning. It had evidently been burning for some time and had gained considerable headway. The town's volunteer fire company fought heroically to confine the flames to the building, but the fire-fighting apparatus proved inadequate, and the blaze was soon beyond control. The fire spread and then jumped across the street and swept both sides. Most of the business blocks burned were three-story brick structures, the upper floors being occupied by offices and as apartments. It was eight hours after the fire was dis-

covered before it was under control. When the Jersey Shore firemen realized that the blaze was getting beyond their power appeals were sent to the Williamsport and Lockhaven fire departments for assistance. One of the Wililamsport department's big motor trucks was started for Jersey Shore, but after covering about a third of the distance was unable to force a way through the snow-drifts, which at places were eight feet deep. The apparatus was run back to the city and loaded on New York Central cars, but as the second start was about to be made word was received that the assistance was not needed. Lock Haven succeeded in getting a part of its apparatus, with a number of firemen, through, but one engine became stalled in the drifts. The council was bitterly censured by the people of the town because of its failure to provide funds for the purchase of modern fire-fighting apparatus for the volunteer company. About a year ago the town suffered a heavy fire loss when several buildings in the business section burned. Immediately after agitation was started for modern fire apparatus and has been kept up ever since, but it was claimed sufficient funds were not available. The estimated cost of the apparatus needed was $11,000.

Firemen Dismissed for Refusal to Continue Work.

Fresno, Cal.—Two members of the fire department were summarily dismissed by chief W. C. Berkholtz upon their refusal to continue work on the California Products Company fire. This stubborn fire had been burning for three weeks, and the chief believed that it would be extinguished within a few days.

Blame Firemen Shortage for Lodging House Deaths.

Paterson, N. J.—Lack of a sufficient number of firemen to raise ladders to the third floor of the Rescue Mission was responsible for the nineteen deaths in the fire which destroyed the building last month, according to a presentment returned by the grand jury to supreme court justice James F. Minturn. The fire department officials and officers of the Rescue Mission home are censured. The presentment stated the building was not properly constructed; there was a lack of fire escapes and not proper care taken to warn the inmates in case of emergency.

Fire Prevention Code for Ohio.

Columbus, O.—A comprehensive fire prevention code for the protection of the workshops and factories of Ohio is to be drafted and its requirements enforced by the state industrial commission. A fire prevention committee to draft the code has been appointed by the general safety advisory committee to the industrial commission, a committee representing the Ohio Manufacturers' Association and the Ohio Federation of Labor. The advisory committee also has named another important related committee, on electrical safety. The fire prevention committee will study fire hazards in the workshops and prepare the safety standards which will constitute the code. State fire marshal T. A. Fleming will work with the committee and his department will co-operate in this new work of the industrial commission.

Regulation of Poolrooms Approved by Voters.

Columbus, O.—As a result of the recent referendum election the so-called billiard and poolroom ordinance is now fully effective. Such places are now all closed on Sunday. According to the regulations "no person, society, club, firm or corporation shall open, conduct, maintain or operate a billiard room unless such persons shall have first been duly licensed by the city for such purpose and shall have obtained a permit therefor; provided, however, that such provisions shall not apply to private residences." Those desiring to open or maintain a billiard room must make application to the city auditor for a permit. No license will be granted to a person who is not a citizen of the United States.

The city auditor shall cause an investigation to be made by the director of public safety as to the character and fitness of the applicant or applicants.

The director of public safety and the chief of police shall detail police officers, whose duty it shall be to obtain information pertaining to all applicants. Such patrolmen so detailed shall furnish such information in writing to the chief of police, who shall transmit the same to the director of public safety.

Every person, society, club, firm or corporation to whom a license is granted shall pay an annual fee therefor in the sum of $10.00 for the first table and $5.00 for each additional table; provided, however, that where the applicant is a society or club not organized for profit, no license fee shall be charged for the use of any table or tables. All moneys received by the way of license fees shall be paid into the general fund of the city.

All licenses granted shall expire one year from date of issue.

It shall be unlawful for any person, society, club, firm or corporation to operate a billiard room between the hours of 12 o'clock midnight and 5 o'clock a. m., on any except Sunday, and between the hours of 12 o'clock midnight on Saturday night and 5 o'clock a. m. Monday, or to harbor or permit any person or persons to be or remain in any such billiard room any day of the week between the hours of 12 o'clock midnight and 5 o'clock a. m.

Factory Fire Loss Blamed on Insufficient Water.

Punxsutawney, Pa.—The bursting of a tank and inadequate water pressure resulted in a $200,000 blaze, which destroyed a big window glass factory here. A dozen railway cars were lost in the flames. The fire started when a block in the tank wall was forced out and the melted glass, like a stream of molten lava, poured out on the floor and over the runway into the flattening house. Employees of the company immediately rushed to the fire hose, which is connected to standpipes throughout the plant, to combat the flames, but, according to their statements, there wasn't enough water to throw a stream a distance of twelve feet. In the meantime alarms were turned in, but by the time the fire bell started to ring the wooden structure was a mass of flames. When the pumping engine was attached to the plug near the plant it was discovered that there was not enough water in the line to throw a stream of water to the roof of a fifteen-foot building, according to fire chief Boney's statements. The local water company officials claimed, however, that the pressure was at least 40 to 65 pounds and was adequate. The citizens have been protesting for some time past.

Army Takes Over New York's "Bomb Squad."

New York, N. Y.—The famous "bomb squad" of the New York police department, which, under the command of inspector Thomas Tunney, has won for itself a national reputation in bringing to justice plotters and spies, has been taken over by the war department, and inspector Tunney and the other officers of the squad have received commissions in the regular army, while the non-commissioned personnel will enlist as soldiers of the United States. In addition to the members of the squad, a score or more of central office detectives, who have been, by special assignment, under inspector Tunney's orders, have also enlisted. The entire squad will be assigned to duty with the army intelligence service in the New York district. The difference in pay received by the men from the government and that which they now receive will be made up by the city under the Fenner law, passed by the last Legislature. The new step taken by the government was characterized by federal officials as of far-reaching importance. Two of the deputy police commissioners of New York—Fuller Potter and Henry J. Case—resigned recently, and both are now in the federal service.

Big Blaze in Business Section.

Attleboro, Mass.—Fire, which started from an unknown origin in a store basement, completely destroyed the block and the one adjoining and a number of other buildings, with a loss of at least $300,000. The fire was the worst the city has experienced since 1898. Despite the fact that so much damage was done and the blaze was dangerous, there was no loss of life. One block was in great danger and was saved only by the persistent efforts of the firemen in maintaining a fire curtain. All the city offices are located in this block. Sparks from the blaze set fire to seventeen dwelling houses, which were rescued by volunteer groups. Mayor Harold E. Sweet was on the scene, and he and chief Packard and ex-chief Edward A. Sweeney saw that outside help was necessary. The departments in North Attleboro, Taunton, Central Falls, Pawtucket and Providence were asked for aid. In eighteen minutes after he received the call Taunton's chief was in Attleboro, and

in thirty-three minutes the big Taunton engine was on the scene. This engine did excellent service. The Providence engine also backed to the river, pumping from the opposite bank. North Attleboro, Central Falls and Pawtucket all rendered valuable assistance. The city will buy a new triple combination like that of Taunton.

GOVERNMENT AND FINANCE

Mayor Wins in Recall Election.

Oakland, Cal.—In a sweeping victory that carried every precinct but nine out of 241 mayor John L. Davie of Oakland was returned winner in the recall election that sought his removal from office. The recall was defeated by a vote of 23,176 to 9,161. Mayor Davie received 20,859 votes, while the aggregate vote of his three oponents was less than 10,000. The total vote cast was estimated at 32,850, a little more than one-third of the city's registration of 89,000. The mayor's home precinct was among the nine he failed to carry. The recall was invoked because of disapproval by a few of the mayor's plans for the development of the waterfront for the benefit of the city.

Mayor Asks Citizens to Fill Appointive Offices.

Elkhart, Ind.—W. H. Foster, mayor-elect, upset all local precedents when he permitted a meeting of thirty-five citizens, including members of both parties, to vote on the appointees he announced. He had invited 150 men to the conference, but had not indicated he intended to leave each selection to a majority vote, and therefore many failed to attend.

Salary Increases for Employees.

Astoria, Ore.—The city council has granted an increase of 10 per cent to all city employees who had asked for raises. The employees affected are the police, street workers and the city physician.

Mansfield, O.—Adopting the report of its special committee and approving in detail the increases in compensation to be given employees of the city, the city council has passed amendments to existing salary ordinances, with the result that wages now paid by the city come nearer to ranking with those paid by private concerns for like service. The following are the officers and places on the city payroll that are given increases with the passage of the new ordinance:

Position.	Present.	Future.
City Hall Janitor	$900	$960
Supt. Sanitary Plant	1,080	1,260
Asst. Eng. Sanitary Plant	840	960
Supt. of Parks	900	1,032
Park Police	780	900
Asst. Park Police	720	840
Inspectors of Sewers	960	1,020
Supt. of Streets	1,020	1,080
Service Repairmen	900	960
Laborers	2.40 day	3.00
Street Sweepers	2.15 day	3.00

These increases are directly in line with the recommendations that have been made to the council during several months by service director Hursh and mayor Lowrey, while increases recently granted police and firemen had been sanctioned and urged by safety director Hughes.

Purchasing Agent Makes Saving.

Davenport, Ia.—That $5,450.57 has been saved for the city of Davenport from January 1 to October 1 is shown in a report submitted by purchasing agent F. W. Friedholdt to the city council and mayor. The report says: "These savings are based on various standing contracts made by this department, which were entered into after a careful study of market conditions, and in anticipation of a steady rise in price of various materials required during the year. These contracts were entered into very early in the year and protected the city against a steady increase in price on materials required during the entire year. By the concentration of the buying for the various departments this office was in a position to make uniform the kind of material and supplies required, which at once placed the city on the wholesale list and secured for us wholesale prices. A substantial saving was made by this method. This saving is based on purchases amounting to $42,799.19, or 12 per cent. You will note the actual savings in buying made during the past nine months was $4,239.31, or $471.02 per month. Discounting bills netted us $164.80. A careful audit of all bills and keeping a businesslike record of all accounts saved an additional $1,046.46, making a grand total savings of $5,450.57, or $605.60 per month. The consolidation of the work of the clerk of the board of public works and purchasing agent means a savings of $1,200 a year in the salaries appropriation. The above report is self-explanatory and plainly shows no mistake was made in combining the two offices, the work being carried on without friction and satisfactory to all the city departments and parties concerned, and without the hiring of any extra help. Among the articles purchased on which saving was made were: automobile tires, accessories, fuel and oil; coal, cement, sand, asphalt and stone; hay, oats and corn; horseshoe supplies; printing; office equipment; police coats and badges; lamps; vitrified sewer pipe, catch basin grates, etc."

TRAFFIC AND TRANSPORTATION

State Commission Has Power to Raise Rates.

Albany, N. Y.—The existence of old laws or local franchises setting maximum taxes does not restrict the state public service commission from increasing such fares in case of necessity. This is in effect the decision of the state commission for the Second District in one of the six-cent fare cases, that of the Huntington railroad, which runs between Huntington Harbor and Amityville, Long Island. By reason of the fact that it presented clearly two questions, one of which is common to nearly all of the street railroad applications and the other to a very large number of them, all the street railroad corporations and all the cities, towns, villages and other municipalities interested adversely were notified of the hearing, and so far as they desired were heard upon all of the legal questions involved. There was no dispute that the Huntington Railroad company required increased revenue in order to enable it to pay its operating expenses. It is reported that no community through which it runs either by its board or council objected to the applicants' case on the facts nor did any of the inhabitants thereof or any of the patrons of the road. The two questions presented were: 1. Whether section 181 of the railroad law, which limits a fare for a continuous ride within any city or village to five cents, precludes the commission from authorizing a six-cent fare. 2. Whether the acceptance by a street railroad corporation of a franchise containing a five-cent fare condition precludes the commission from increasing such fare from five to six or more cents for one continuous ride in the same city or municipality. The commission decided that subdivision 1 of section 49 of the public service commission law was intended by the legislature to vest power in the commission, and has made it the duty of the commission, where it finds upon a sufficient showing that in fact the maximum rates or fares chargeable either under section 181 of the railroad law or under the local franchise are insufficient to yield reasonable compensation for the service rendered, and are for that reason unjust and unreasonable, to authorize the increase of such fares. The principal opinion is by commissioner Carr, who cites all of the decisions and all of the statutes of the state of New York having any bearing, historical or otherwise, upon the question. There are concurring opinions by each of the other commissioners. A summary statement of the decision is that the commission has followed the court of appeals in the Ulster & Delaware case (218 N. Y. 643), and the appellate division for the third department in the New York & North Shore case (175 app. div. 869). After authorizing the advance of the Huntington company's fares from five to six cents the commission order concludes: "This determination and order may be reopened at any time if and when it may appear to the commission that the controlling reasons for allowing an increase of

fares in excess of those which otherwise would legally obtain no longer exists." Commissioner Carr quotes the sections of the public service commission law and enumerates the powers of the commission in the regulation of street railway lines and service. He then says:

"What was the purpose of these sections giving such drastic powers to the commission and authorizing it to place burdens on the electric railways, unless the commission was at the same time authorized to give such relief in the way of increased fares as might be necessary to enable the corporation to receive a fair return on the increased investment made necessary by the orders of the commission? It cannot be successfully urged that the commission has the right to order such improvement in service and equipment as might be necessary for the safety of the traveling public, even though this action on its part might in effect operate to confiscate the property of the corporation, for this is contrary to the law of the land. What then does the law contemplate in this respect? The answer is that the commission is empowered to require the corporation to give proper service, and, on the other hand, to require the public to pay reasonable rates for such service. The law as it exists at the present time requires the commission to determine the just and reasonable rates which will enable electric railways to earn a reasonable return upon the value of the property actually employed in the public service and to provide a reserve for surplus and contingencies. So we believe it may be said to be settled that the legislature has full power to delegate rate-making powers to the public service commission and that the commission has full power to fix just and reasonable rates for carriers and public service corporations and that the fixing of rates is a proper exercise of the police power of the state."

It might be claimed, says the commissioner, that because section 181 of the railroad law does not specifically provide for an increase in the rate of fare, therefore the only power of the legislature or the commission is to reduce that rate. On this point he remarked:

"We think that such a decision would be quite untenable because it would be equivalent to saying that the legislature is powerless to amend a general law no matter what the necessity might be or how important for the welfare of the public. While we believe that the use of the word 'regulate' implies an increase as well as a reduction in fare, yet it may be that when the word was first used by the legislature it was intended to mean any revision of the fares charged by electric railways and that the word 'reduce' was used to apply to rates charged by electric railways in excess of 5 cents pursuant to special acts of the legislature, but in any event it is entirely inconsistent with the public service commission law to attempt to hold that the only power given the commission is to reduce fares when the statute particularly imposes upon it the duty to determine the just and reasonable rates which are necessary in order to provide a reasonable return upon the value of the property employed in the public service."

On the other basic question, involving the control of local franchises over fares, commissioner Carr says: "It is settled beyond question that municipalities have no right to impose conditions in franchises other than those which the statute gives them the power to exact. The fact that conditions restricting the fare within the municipality are imposed in a franchise does not deprive the legislature of the supreme power to determine what conditions shall be imposed upon an electric railway corporation. There is no decision in any of the courts in this state which attempts to hold that the legislature in the enactment of general laws governing the creation and operation of railroads, whether electric surface or otherwise, has in any respect conferred upon the municipalities the power to fix a rate of fare in a specific amount. It has delegated the power at different times to fix maximum rates, but this was always subject to the right of the legislature to intervene and revise and alter such rates as might be fixed under the delegated power.

Cost of San Francisco Car Strike.

San Francisco, Cal.—The first six weeks of the street car strike in this city cost the United Railroads approximately $1,231,853, according to an estimate based upon the report of the financial condition of the traction company submitted to the supervisors by the state railway commission. In its request for the financial report the board of supervisors referred to the fact that president Lilienthal of the United Railways had stated that his company was unable to accede to the demands of the striking carmen for a wage increase because the income of the company was not sufficient to justify it. The supervisors stated further that they desired to ascertain whether the refusal of the company to arbitrate or to grant the demands of its employees was justified on financial grounds. The railroad commission, in a letter to the supervisors, announcing that its jurisdiction does not permit it to "ascertain whether the company's position is justifiable," and it simply submits a detailed report of the company's financial condition, without any comment beyond a brief introduction. The report shows that the operating statement of the United Railroads for the month of July of this year gave a profit of $171,468.39, while the operating statement for the month of August, which embraced the first two weeks of the strike, showed a deficit of $239,149.45. The first two weeks of the strike, therefore, cost the traction company just $410,617, or $205,308 a week. Taking this loss as a basis, the estimated loss for the first six weeks is arrived at, as shown above. The total wages paid by the United Railroads to its platform men in the year 1916 amounted to $1,682,525. It is therefore conservatively estimated that the cost of the strike during the first ten weeks was considerably more than a whole year's wages for all of its platform men. While the strike was at its height the company was incurring a loss of nearly a million dollars a month rather than grant a wage increase which would have amounted to only slightly more than three-quarters of a million dollars a year. The operating expenses of the company jumped from $417,285 in July to $615,060 for August. This means that in the first two weeks of the strike the company had to make an extraordinary outlay of $197,775 over and above its operating cost. This sum presumably was spent for the importation and arming of strikebreakers, and for wage bonuses paid them. The company's passenger revenue for July was $622,282. In August it was $409,429.

The average wage paid by the United Railroads to its platform men in 1916 was 30½ cents an hour. During the first six months of 1916 this average was raised to 32 cents, and in July it was raised to 33 cents. An analysis of the weekly wages received by conductors and motormen of four typical United Railroad lines in 1916, when the company's scale of wages ranged from 25 cents to 35 cents per hour, shows that the weekly earnings of the men ranged from $14.10 to $22.90. In June of this year the maximum wage was raised to 36 cents an hour, and in July to 37 cents. According to the report, the salaries of the higher officials make an interesting study. The president of the railroads receives $39,000 a year; the general manager, $25,000; the assistant to the president, $12,000; the secretary, $6,000. The surgeon receives $4,800; the claim agent, $4,200, and the tax agent, $4,800. Three attorneys receive $11,000, $10,000 and $3,600, respectively, while, on the other hand, the chief engineer's salary is $3,900; the master mechanic's is $4,200, and the chief electrician's is $2,700, and that of the purchasing agent is $2,400. In addition to the three attorneys mentioned, fifteen other employees of the law department of the company receive an aggregate wage of $1,335 per month.

The report states that, as it is the practice of the Municipal Railway to pay for the time its men are on duty, regardless of whether they are actually engaged in running or not, while the United Railroads platform men are only paid for the actual running time of their cars and receive nothing for the time they are waiting at the car houses for runs, it is impossible to determine what the exact increased cost would be to the United Railroads if the municipal wage schedule of $3.50 for eight hours—which the strikers are demanding—were applied to its employees.

Valuation of Minneapolis Street Railways.

Minneapolis, Minn.—Following the valuation by city engineer Cappelen last year, another official report has been made on the valuation of the property of the street railway system, which is controlled by the Twin City Rapid Transit Company. The new valuation is by James D. Hogarth of the city attorney's office at Milwaukee, who was retained by mayor Thomas Van Lear. The new estimate is less than that made by the city engineer, although it is based upon the Cappelen analysis and gives the same value for real estate. Some of the comparisons are as follows:

	Cappelen.	Hogarth.
Rolling stock	$4,649,318	$4,066,950
Real estate	1,088,862	1,088,862
Tracks	2,743,564	2,232,337
Bridges	126,427	112,256
Total valuation	16,205,638	13,608,730

The reports differ more in their estimate of depreciation. In the case of one line of road the city engineer estimated the cost to reproduce at $89,629, figured the depreciation at $1,141 and left the true valuation at $88,475. Mr. Hogarth contended that if labor depreciation was allowed also the section would be valued at $70,555. Mr. Hogarth said new cars could be reproduced at $6,000 or less, and he made a 10 per cent depreciation deduction and a further deduction of $400 a car for pay-as-you-enter equipment, which he said are necessary to permit economical operation.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Dec. 26-29.—AMERICAN POLITICAL SCIENCE ASSOCIATION. Annual meeting, Philadelphia, Pa. Secretary, Clinton J. Swartz, Trenton, N. J.

Dec. 27-29.—AMERICAN SOCIOLOGICAL SOCIETY. Annual meeting, Philadelphia, Pa. Secretary, Scott E. W. Bedford University of Chicago, Chicago, Ill.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

Public Ownership League.

A Public Ownership Conference under the auspices of the Public Ownership League of America was held November 25 to 27 at the Hotel La Salle, Chicago, and drew a large number of well-known speakers on all phases of this subject.

On Sunday morning the president, A. M. Todd, delivered his address on "Municipal and Public Ownership in Europe." The program follows: Prof. Charles Zueblin, "The Public Ownership of Railroads"; Louis F. Post, "The Public Ownership of Land"; Gifford Pinchot, "The Conservation of Natural Resources"; Henry H. Klein, "Proper Methods of Financing the Acquisition."

At the afternoon session the following papers were presented: Harry Laidler, New York, "A Survey of Public Ownership Throughout the World." Dr. Delos F. Wilcox, "Financial and Administrative Preparation for Municipal Ownership." J. W. Brown, of the National Executive Committee of the United Mine Workers of America, "Why Organized Labor is for Public Ownership." Samuel R. Maxwell, organizer for the National Nonpartisan League, "The Farmer's Interest in Public Ownership." Henry M. Ashton, Chicago, "The Municipal Ownership Movement in Chicago." Dr. M. G. Lloyd, associate electrical engineer, Dept. of Commerce, Bureau of Standards, "Standards for Electric and Gas Service."

In the evening papers were read as follows: E. W. Bemis, Chicago, "From Regulation to Public Ownership." Carl S. Vrooman, assistant secretary of agriculture, "Public Ownership of Railways." William English Walling, "Public Ownership and Internationalism"—a survey of public ownership throughout the world. James B. Balch, mayor of Kalamazoo, Mich., "Municipal Fuel Yards." J. G. Glasgow, manager, Winnipeg municipal light and power department, "Municipal Ownership in Winnipeg."

The Monday morning session featured the following speakers: Benjamin C. Marsh, New York, "Proper Methods of Financing the Acquisition of Public Utilities." J. Weller Long, secretary, American Society of Equity, "Why the Farmer Needs Public Ownership." R. B. Howell, commissioner of public works, Omaha, Neb., "Municipal Water Works." R. F. Pettigrew, "The Fight for National Forests." Charles H. Ingersoll, New York, "The High Cost of Living and How to Meet It." W. J. Hannah, Big Timber, Montana, "Farm Credits for the Common Good."

In the afternoon the following were heard: Louis Wallis, Chicago, "Public Ownership, the Immediate Issue and the Common Ground for Social Reforms." F. W. Ballard, "Cleveland's Electric Light Plant." Edward F. Dunne, "Public Ownership Movements in Illinois." Florence Kelley, "Immediate Steps Toward the Postalization of the Telegraph and Telephone." Anna Maley, Minneapolis, "Public Ownership and the High Cost of Living." O. M. Thomason, lecturer for National Nonpartisan League, "The Public Ownership Movement in the Northwest."

On Monday evening the following spoke: Homer Talbot, secretary, Kansas League of Municipalities, "Municipal Ownership in Kansas and the Southwest." Daniel W. Hoan, mayor of Milwaukee, "The Failure of Regulation." Frank P. Walsh, chairman U. S. Commission on Industrial Relations, "Public Ownership and Industrial Conditions." Thomas H. McCauley, superintendent Municipal Railway, Calgary, Canada, "The Calgary Municipal Railway."

Tuesday morning was devoted to the following speakers and themes: Charles T. Farson, registrar, Cook County, "The Torrens System of Land Title Registration." Charles K. Mohler, secretary Public Ownership Committee, Los Angeles City Club, "Municipal Ownership in the Pacific Coast Cities." Victor L. Berger, editor Milwaukee Leader, "Public Ownership and the High Cost of Living." Walter J. Millard, "Proportional Representation as a Means of Securing Democratic Control." H. D. Flint, Chicago, "The Monorail System of Railways." Hugh Reid, "The Struggle for Municipal Ownership of Street Car Lines in Chicago."

In the afternoon were presented: C. W. Koiner, "The Pasadena Electric Light Plant and the Fight for Municipal Ownership in Southern California." Ray McKaig, state master, North Dakota Grange, "The National Grange and Public Utilities." F. F. Ingram, Detroit, "The Co-ordination of Water with Rail Transportation and a Rational System of Rate-Making." Robert Buck, "The Hydro-Electric Light and Power Plant of Chicago—the Largest Municipal Plant in the States." E. E. Carr, "Public Ownership of Mines." Judson King, "Popular Government Necessary to Public Ownership."

The meetings ended with the following series of papers on Tuesday evening: John C. Kennedy, member, Chi-

(*Continued on page* 620.)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

SEWER extensions to cost $100,000 are to be built by Pottstown, Pa. The engineer for the improvement is C. E. Collins.

A SEWERAGE SYSTEM is to be built by Penn Station, Pa., plans for the work having been drawn by the engineer, Louis D. Tracy.

Rosedale, Kan., is to build a TUNNEL and other creek diversion structures. Plans and specifications were the work of the firm of Harrington, Howard & Ash.

In its controversy with the local street railway company regarding CAR FARES and SERVICE, the city of Trenton, N. J., has retained as its expert Peter Witt to make a survey of the company's property.

Before allowing the local traction company to extend its lines, the city of Dallas, Texas, has retained George E. Kessler, landscape engineer, to make a survey and prepare part of a CITY PLAN covering this phase of the city's development.

Prairie City, Ia., is improving its WATERWORKS. The engineer for the city is Lawrence W. Cox.

Newport, Ark., is to make FLOOD PROTECTION improvements. Plans for the work are being prepared by the Morgan Engineering Company.

The WATERWORKS of Guthrie, Okla., will be improved at a cost of about $200,000. Plans are in course of preparation by the Benham Engineering Company.

Reinforced concrete BRIDGES to cost more than $300,000 are to be built by Hehama county, Red Bluff, Cal. The supervisors had plans and specifications for the work prepared by the engineering firm of Weeks & Day.

Johnstown, Pa., has voted $500,000 bonds for the construction of a SANITARY SEWER SYSTEM. The city has retained the consulting engineering firm of Gannett, Seelye & Fleming to prepare plans and specifications for the work.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

TURBINE TRACTION GRADER.

Koehring Machine of Big Capacity With New Features.

The Koehring turbine grader is a power-driven machine which moves forward under its own power, cutting the roadbed and elevating and loading the material into trucks or wagons in position alongside. It is built to dig and load from 60 to 100 cubic yards per hour and is said to be replacing from 100 to 125 men on street and road grading jobs for such well-known paving contractors as the American Asphalt Construction Company and the White Paving Company of Chicago. This labor-saving factor is bound to be very important for contractors at present. With labor scarcity and the necessity for time-saving, the big capacity of this machine becomes more and more a source of valuable economy. On large camps removed from labor centers, the reduction in the number of men needed may easily mean obviating the necessity of maintaining a costly construction camp. The Koehring grader requires only one skilled operator and two helpers, one assisting the operator and the other staking the grade and directing the movement of teams.

The digging action is accomplished by a rotating cylinder, on which are mounted twelve buckets. On the cutting edge of these are rooters, which dig out the material, tumbling it back into the buckets which elevate and dump it on the belt conveyor extending at right angles from the sides of the grader in position to discharge the material directly into wagons, trucks or cars. The conveyor may be adjusted to load on either side of the grader.

The cutting wheel is adjustable vertically to make a cut from one inch to two feet deep. Cuts are five feet seven inches wide. While the digging wheel is in action the entire machine moves forward at any of three speeds, according to depth of cut and character of material. The weight of the grader is carried on two sets of multiplanes, which do away with planking and prevent settling. Each multiplane has a contact surface of five feet long and one foot eight inches wide. The pressure on the ground is seventeen pounds per square inch. The operator maintains grade by sighting across properly placed grade stakes and any settling is easily detected and corrected by elevating the cutting turbine. Control is completely centralized in the operator's cab, from which the cutting wheel is raised or lowered and the machine sent forward at its various speeds, or reversed. The traveling speed is one mile per hour. Short turning is accomplished by separate control for each set of multiplanes, enabling one set to "walk around the other," practically turning the machine within its length.

Gas engine power is from 4-cycle, 4-cylinder, vertical 6¼x8-inch engine, rated 45 h. p., and developing 60 h. p. on brake—tubular radiator. Steam power is from Simplex engine, rated 25 h. p., and 30 h. p. boiler.

All construction is for heavy duty. The turbine rack is made of manganese steel segments, driving pinions are of manganese steel; gears and bearings are all of special cast steel; idlers are bronze-bushed; all shafting is extra heavy and all bearings have genuine babbitt.

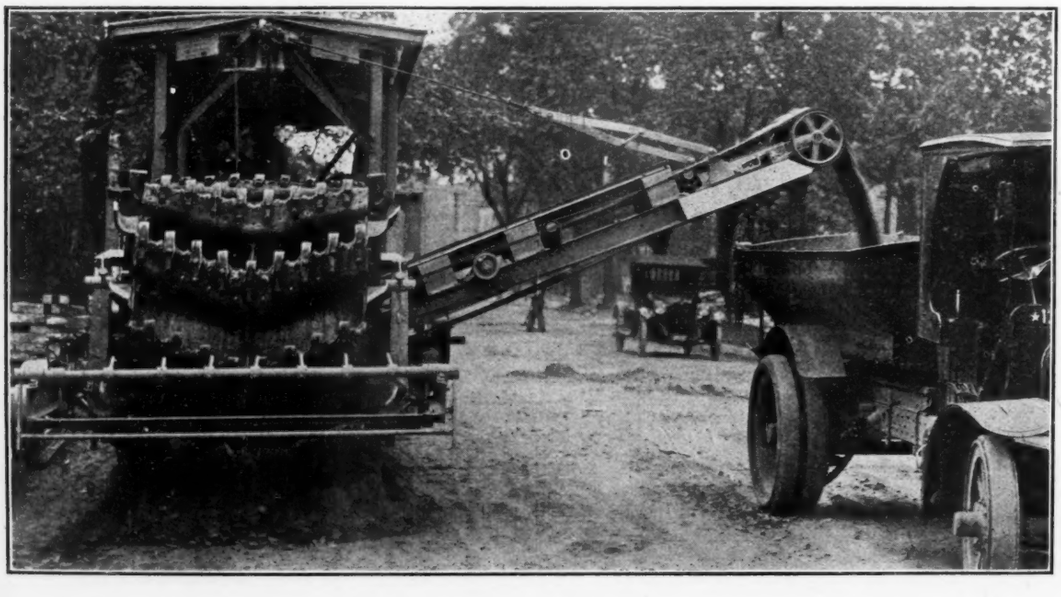
Over-all dimensions are: Height, 11 feet 11 inches; length, 32 feet; width, including conveyor, 17 feet 8 inches; width, with conveyor folded, 10 feet. The weight, with gas engine, is 45,000 pounds.

If desired an automatic screen can be installed inside the cutting wheel for screening old macadam to save stone.

It is claimed that the grader practically standarizes grading costs, since it is equally effective on any kind of work, ripping out and loading macadam or rubbery clay about as easily as gravel dirt. It is calculated that on well-handled jobs a three-cent cost for loading two-yard wagons may be obtained. On material on which hand shovel labor is five wagons per day, the Koehring is claimed to be able to do six hundred wagons or more per day.

The accompanying cut shows a job at Milwaukee, Wis., work done by the White Paving Company, illustrating the adaptibility of this machine for shallow grading. A cut of eight inches was taken from an old waterbound macadam street which had been in service for a number of years. The machine did this with such efficiency that a comparison can hardly be made with any other means for handling this class of grading. On this work the White Paving Company used dump wagons and also motor trucks and even with this shallow grading they succeeded in loading three-ton dump trucks in less than 1½ minutes, at a cost of about four cents per cubic yard for digging and loading the material on the truck.

The machine is made by the Koehring Machine Company, Milwaukee, Wis.



KOEHRING TRACTION GRADER TAKING 8-INCH CUT FROM OLD MACADAM STREET.

FLEXFORM JOINT.

Mold for Poured Joints for Vitrified Clay Pipe.

Good results lately achieved with poured joints of cement grout in the installation of vitrified clay pipe indicate that this method is soon destined to become widely favored in building drain and sewer construction. Much work has been done in an effort not merely to make a better joint, but one in which the possibility of error through inexpert workmanship is reduced to a minimum. The advantages claimed for the poured joint are: Greater uniformity in quality; denser cement when set; more rapid operation; considerable saving in material; less need for working space in trench; neater joint.

Several types of mechanical mold for vitrified pipe joint have been designed and patented. The mold used by the Sewer Pipe Manufacturers' Association in demonstrations is called the "Flexform" and is composed of a series of overlapping sheet metal plates, strung on two steel cables of small diameter. When passed around the joint and clamped, it holds the spigot end of one pipe centered in the bell of another, and holds the grout that is poured into a funnel at the top. During the period of setting it protects the bond of the cement against any shock or strain.

The joint is caulked with oakum, which is properly compacted to form a gasket—and prevent the flow of joint material into the interior of the pipe. The mold is first dipped in oil to prevent grout adhering. It is passed under and around and clamped so that it takes a firm grip on both pipes with enough overlap on the socket to insure even and maximum space for the joint material. It is recommended that sufficient molds be provided for the entire number of joints, or, in the case of large continuous operations, enough for one day's work. Molds are clamped on the entire number before any are poured. A good material consists of one part by volume each of cement and medium sand, mixed dry and then with water to a consistency of thick cream. A little water is first poured into each mold to insure free flow. The grout is poured immediately afterward—enough being used to fill both the mold and the funnel—while a slight leakage acts as a safeguard against air-holes or water obstruction. Molds are left in place for twelve to twenty-four hours to get the initial set. The mold unclamps in such a manner so as to split the funnel or hopper into two parts, leaving a protruding jet of surplus joint material shaped like a funnel. These jets can be removed by stirring the cement in the funnel with a small rod during the setting period.

The accompanying illustrations show the joint being poured, the completed joint and a test. It is recommended that 48 hours be allowed to elapse before water pressure be applied. Lines of pipe joined by this method have repeatedly withstood pressure four or five times that required by specifications. The Flexform is the invention of Dewitt H. Wyatt, 1672 Summit street, Columbus, O.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices at all points remain the same after the recent rise. Quotations: Chicago, 4-inch, class B and heavier, $58.50; 6-inch, $55.50. New York, 4-inch, class B and heavier, $59.50; 6-inch, $56.50. Birmingham, 4-inch, class B and heavier, $53; 6-inch, $50; class A, $1 extra, all sizes.

Portland Cement Association.

B. F. Affleck, Chicago, was re-elected president of the Portland Cement Association at its annual meeting at the Hotel Biltmore, New York, Dec. 12. Mr. Affleck is president of the Universal Portland Cement Co. F. W. Kelley, president, Helderberg Cement Co., Albany, N. Y., was elected first vice-president, and Richard Hardy, president, Dixie Portland Cement Co., Chattanooga, second vice-president. G. S. Brown, president, Alpha Portland Cement Co., Easton, Pa., was elected treasurer.

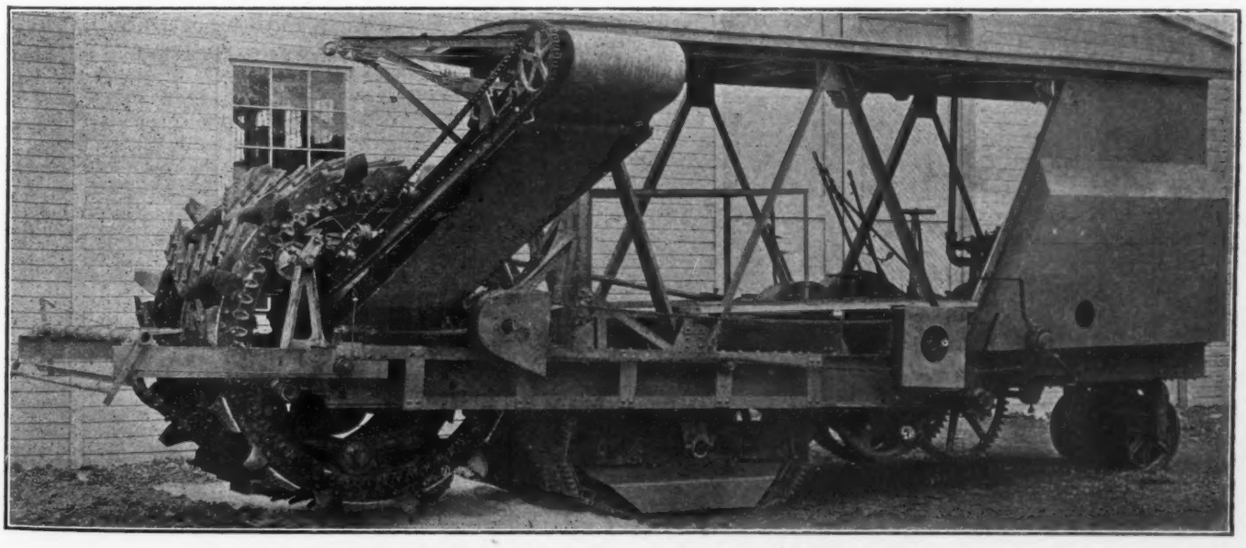
The Portland Cement Association has turned its activities largely to the promotion of permanent roads in line with the desire of the Council of National Defense that through routes be quickly developed to supplement the railways, especially for short-haul traffic.

Walter A. Zelnicker Supply Co., St. Louis, Mo., has issued Bulletin No. 227, announcing a comprehensive list of real bargains in all kinds of contractors' and public works' machinery.

Road Machinery Manufacturers' Association.

At a meeting of road machinery manufacturers held in Chicago December 11, an association was formed for purposes which include "the promotion of friendly relations and the discussion and exchange of ideas for the benefit of its members, and the promotion of good roads." Only manufacturers of road machinery are eligible to membership, and practically every such manufacturer in the country has become a member. The following officers were elected:

President, William T. Beattey, Austin-Western Road Machinery Co., Chicago; vice-president, David B. Cook, Acme Road Machinery Co., Frankfort, N. Y.; secretary-treasurer, M. W. Baker, Baker Manufacturing Co., Springfield, Ill. The board of directors of the association consists of these officers and the following: S. Jones Phillips, American Road Machinery Co., Kennett Square, Pa.; W. R. Adams, J. D. Adams & Co., Indianapolis, Ind.; E. B. Smith, Smith & Sons Manufacturing Co., Kansas City, Mo., and C. O. Wold, Russel Grader Manufacturing Co., Minneapolis, Minn. The affairs of the association will be managed by the board of directors.



KOEHRING TURBINE TRACTION GRADER (SIDE VIEW).

NEWS OF THE SOCIETIES

(*Continued from page 617*)

cago City Council, "The Chicago Municipal Water Works." David J. Lewis, U. S. Tariff Commission, "The Case for the Postalization of the Telegraph and Telephone." S. J. Konenkamp, international secretary, Commercial Telegraphers, on "Labor's Interest in Postalization." Herbert S. Bigelow, Cincinnati, "The Outlook and Progress of Public Ownership in America."

Fire Marshals' Association of North America.

The recent convention of the marshals held at New Orleans was well attended by about sixty delegates. As this was the first convention following the declaration of war much of the attention of the members was devoted to the prevention of incendiarism by enemy plotters.

Gov. Pleasant welcomed the delegates for Louisiana, and mayor Behrman extended the greetings of the city. President T. L. Hussey, of Topeka, fire marshal of Kansas, delivered the annual address.

The afternoon program included addresses on "Signs of the Times," by C. J. Doyle, of Springfield, Ill.; "Woman's Part in Fire Prevention," by Miss Bessie Street Coburn, of Mississippi; a round table discussion on "Fire Waste vs. the High Cost of Living," by E. M. Gillenwaters, of Tennessee; an address upon "The Problem of Attack," by Franklin H. Wentworth, of Boston, and a round table discussion on "Utilizing Fire Departments for Fire Prevention Work As Well As for Fire Fighting," led by S. W. Inglish, state fire marshal of Texas.

Thursday morning's session was occupied with papers and round table discussions, and in the afternoon the delegates were guests of W. M. Campbell, fire marshal of Louisiana, and his local committee on a boat trip through the harbor.

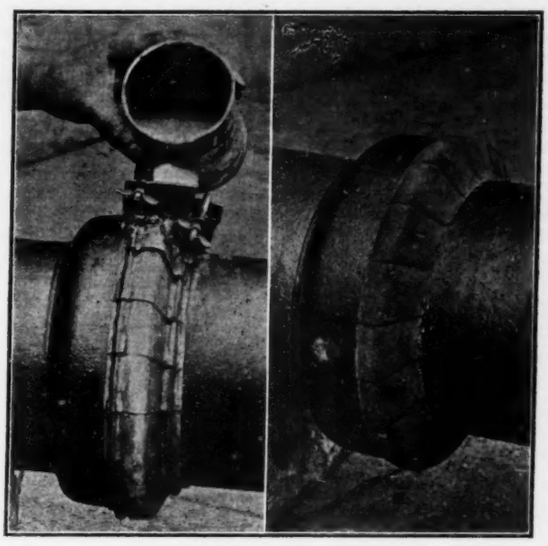
Creation of a permanent federal bureau of fire prevention, nationwide in scope, to co-operate with state and city departments, was advocated by William M. Campbell, Louisiana fire marshal.

The use of paid advertising space, the hitching of fire prevention propaganda to items of special news interest and greater care in writing and issuing publicity matter were advocated as aids to fire prevention, in a paper on "Fire Prevention and the Press," by Imre Zuwalt, deputy state fire marshal of Kansas.

Other papers read Friday morning were: "What Constitutes Evidence in the Prosecution of Arson," by F. R. Morgridge, of the National Board of Fire Underwriters"; "Fire Prevention Possibilities," led by T. Alfred Fleming, state fire marshal of Ohio; "The Value of Uniform System of Statistical Records," led by James R. Young, insurance commissioner of North Carolina; "Co-operation, Efficiency and Preparedness," by H. H. Friedley, state fire marshal of Indiana; "How May We Secure Better and More Efficient Co-operation Between Fire Marshals and Local Fire Chiefs," round table discussion led by S. E. Grans, state fire marshal of South Dakota; "Automatic Sprinklers from the Fire Marshal's Standpoint," by Paul Mason.

Adopting resolutions asking the federal government to empower the National Council of Defense with greater equipment for enforcing fire protection, even to establishing armed guards if need be, the association concluded its convention by the election of the following officers: James R. Young, Raleigh, N. C., president; William M. Campbell, Louisiana, vice-president; John G. Gamber, Illinois, secretary; L. T. Hussey, retiring president, Kansas, and E. P. Heaton, Ontario, members of the executive committee.

The following cities extended invitations for the next annual convention: Indianapolis, Sioux Falls, Portland, Ore.; Columbus, O.; St. Louis, Memphis, New York, and San Francisco. The place of meeting will be decided by the executive committee.



METHOD OF POURING FLEXFORM JOINT IN VITRIFIED CLAY PIPE (SHOWING CONSTRUCTION OF MOLD AND CLAMPS AND APPEARANCE OF FINISHED JOINT).

Illinois Municipal League.

The fourth annual convention of the Illinois Municipal League and the League of Illinois Municipalities was held at the University of Illinois, Urbana-Champaign, December 6 and 7. Mayor William E. Barber, of Joliet, delivered the president's address.

The following papers were read and discussed at the three sessions of the convention: "Municipal Home Rule in Ohio," A. R. Hatton, Cleveland; "Municipal Home Rule in Other States"; "Municipal War Works," Robert E. Cushman, University of Illinois; "Atmospheric Sanitation" (illustrated), Prof. C. S. Sale, University of Illinois; "Garbage Incinerators," Prof. J. E. Smith, University of Illinois; "The Sanitary District Law," James S. Baldwin, Decatur; "Community Morals," Clifford G. Roe, assistant corporation counsel, Chicago; "The City Management Plan for Chicago," George C. Sikes, Chicago bureau of public efficiency; "Municipal Accounting," John B. Tanner, Chicago; "Street Railway Franchises in Illinois," Earl W. Rugg, Monmouth; "The League of California Municipalities," William J. Locke, executive secretary.

TESTING FLEXFORM JOINT IN VITRIFIED CLAY PIPE.